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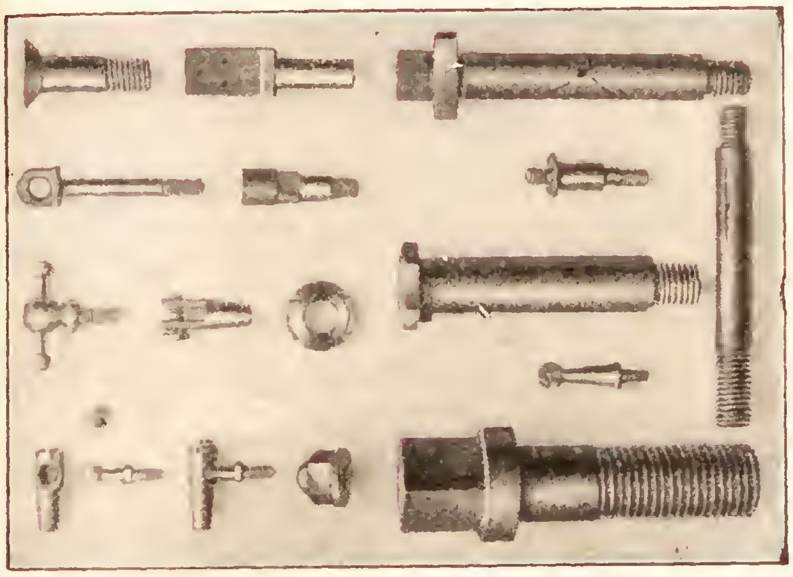

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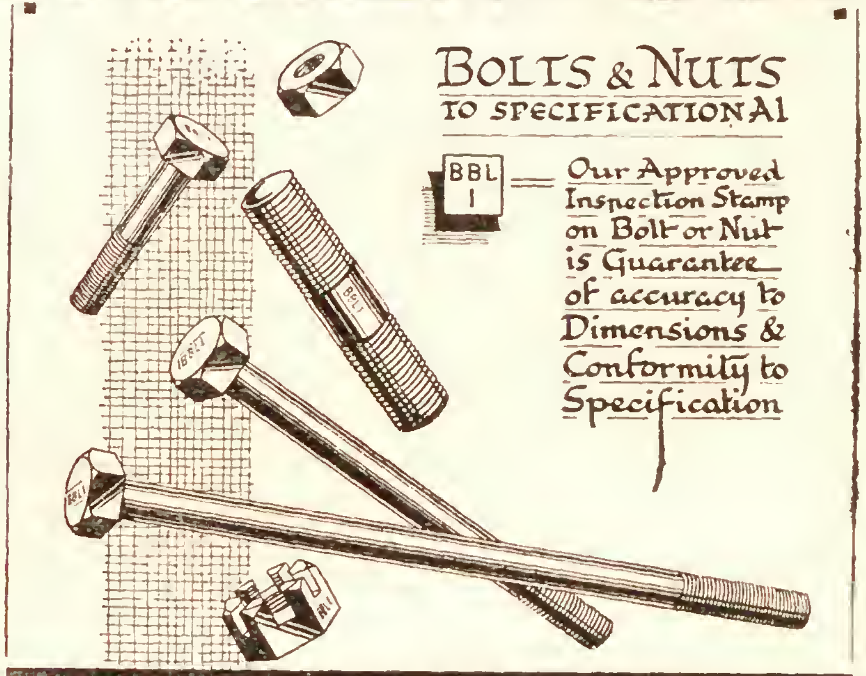

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The AIRCRAFT ENGINEER & AIRSHIPS

First Aero Weekly in the World

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A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport

OFFICIAL ORGAN OF THE ROYAL AERO CLUB OF THE UNITED KINGDOM

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Flight

The Aircraft Engineer and Airships

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CONTENTS

Editorial Comment PAGE
- Profit and Loss ... 1
- Air Control ... 2
- Airship Clubs... ... 2

Blackburne Thrush Light 'Plane Engine ... 3
Italy's Air Organisation... ... 7
Light 'Plane Club Doings ... 8
Aeronautical Research Committee Reports ... 9
Royal Aeronautical Society Official Notices... ... 9
Wright-Bellanca Six-Seater ... 10
With Seaplane and Sledge in the Arctic ... 11
Advisory Committee Report on Atmospheric Pollution... ... 12
Correspondence ... 12
Royal Air Force ... 13
R.A.F. Intelligence ... 13
Air Post Stamps ... 14

DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:—

1926	
Jan. 7	Prof. A. J. Sutton Pippard. "The Experimental Stress Analysis of Frameworks," before R.Ae.S.
Jan. 9	Aero Club of Belgium 25th Anniversary Banquet.
Jan. 11	F.A.I. Conference, Paris.
Jan. 12	Mr. C. Howarth. "Some Aspects of Full-Scale Experiments," before Inst.Ae.E.
Jan. 13	London Aeroplane Club Inaugural Dance, Suffolk Galleries, Suffolk Street, W. 1.
Jan. 21	Maj. J. S. Buchanan. "The Schneider Cup Race, 1925," before R.Ae.S.
Jan. 26	Lieut. Olechnovitch. "The Care and Maintenance of Tools as an Important Factor in Workshop Routine," before Inst.Ae.E.
Feb. 4	Joint Meeting of R.Ae.S. and Inst.Ae.E. at R. Soc. of Arts. Mr. C. L. Lawrance, "American Aircraft Engine Development."
Feb. 9	Informal Meeting, Inst.Ae.E.

EDITORIAL COMMENT.

AS might have been anticipated, the first published annual figures of Imperial Airways, Ltd., a *résumé* of the proceedings of whose first ordinary general meeting was published in last week's issue of FLIGHT, showed a loss. Nobody who had been watching the air traffic at Croydon during the last year or so would have expected otherwise. In view of the sums involved, the actual loss is not, of course, a particularly serious one. The explanation given for the deficit is that the first year of the company's existence is regarded as mainly an experimental period, and that the work of centralising the control, from the four separate companies working when Imperial Airways Ltd. came into being, into a single organisation, was a considerable handicap. While there is, of course, no denying that this reorganisation must for a time have resulted in some dislocation and loss of time, it will not, we think, be generally agreed that the company's activities have since been such as to give any great hope for an immediate improvement. The period may be regarded by the directors as experimental, but on the other hand, the company started with the advantage of the accumulated experience of the four operational companies that had been working for a considerable period, so that there was not, or should not have been, very many problems of a new character to solve. Each of the four companies had very extensive knowledge of the particular route operated by it, and the exact capabilities of all the machines were well known. It is thus somewhat difficult to appreciate what there can have been, of a very experimental character, to discover.

Profit and Loss

Reference is also made in the report to a delay that occurred during the early part of the company's financial year, owing to "regrettable and serious labour troubles." Presumably, what is meant here is the dispute with the pilots, who rightly insisted upon a rate of pay commensurate with the nature of the work they had to do. If it had not been for the fact that the company seemed to regard the air line pilots as little more than taxi-drivers, this delay would not have occurred, and so in the end the company itself is to a great extent responsible for "the very adverse effect on operations" which this dispute is claimed to have had.

In the matter of machines, it is an open secret that the company let its fleet dwindle until only a very few machines were in operation, and although the report does not appear to make any reference to this state of affairs, it is fairly obvious that the question of the amount of flying done must have had a serious effect upon returns.

Personally, we are of the opinion that failure to attract the right kind of traffic in sufficient volume is likely to have been responsible to a very much larger extent than any shortcomings in the machines as regards being "commercially economical" types. Nor are we at all convinced that under the new subsidy basis, whereby not machine-miles flown but horse-power miles are to be the standard by which the operations are judged, is likely to lead to any great improvement. It may be granted that the new large and powerful machines which are coming along will be more economical in that they will carry, on any one flight, a larger number of passengers, and that, therefore, such costs as pilots' salaries, &c., which are independent of the number of passengers or weight of load carried, will not increase in proportion. On the other hand, as Major C. C. Turner pointed out at the last monthly Royal Aero Club dinner, it would seem that the new basis will be likely to result in considerably fewer flights being made, and this would certainly tend to discourage rather than encourage air travellers. Take the London-Paris route. If a business man is assured that if he goes to Croydon almost any time of the day, he will not have to wait very long before there is a machine leaving, he is much more likely to use the air service than if there is but one machine per day, which may leave at a time that does not suit his particular arrangements. And as we have previously pointed out, in our view, improvement is to be found rather in attracting greater traffic than in any possible vast improvements in the machines. While, therefore, we do agree that, as regards safety and reliability, the new large machines will, in all probability, represent a considerable improvement, we are not nearly so certain that they will, unless a very large number of them is used *and filled*, be economically better. It seems to stand to reason that it is cheaper to run a small machine with full load than a large machine with half or quarter load.

Another line of improvement would seem to be the use of particular types of machines for particular purposes.

* * *

Air Control

One is curiously reminded of the old doggerel "Little satisfaction some men find in life, Some want quick divorces, others want a wife," by two newspaper paragraphs published on the same day, December 12. In one reference is made to the coming fight for a single air service, which certain parties in the United States desire, claiming that separate air services for army and navy lead to overlapping and waste. The other foreshadows a revival in Great Britain of the fight for a separate air arm for each of the services. Thus we have the somewhat curious spectacle of one nation with divided air services wanting a single air service, and another which, having at great trouble secured a single service, wants to split it up again. FLIGHT's attitude is too well known to need reiteration here. We initiated, and have always stood for, the slogan "One service, one uniform, one badge," and we have so far seen nothing in this or any other country to give us cause to change our opinion. That the fight will be revived in this country, particularly over the airship question, we have not the slightest doubt, nor are we at all sure that there would be much harm in handing airships over to the Navy, although by its earlier attitude towards "gas bags" the Navy has done little to deserve being put in charge, but the design, construction and operation of airships are so much more parallel with maritime problems, than heavier-than-air craft, that a very good case could be made out. As regards the Royal Air Force, however, we entirely disagree with the validity of the Navy's claims, nor have we any fear that the Admiralty will succeed in the fight, the revival of which is foreshadowed.

* * *

Airship Clubs

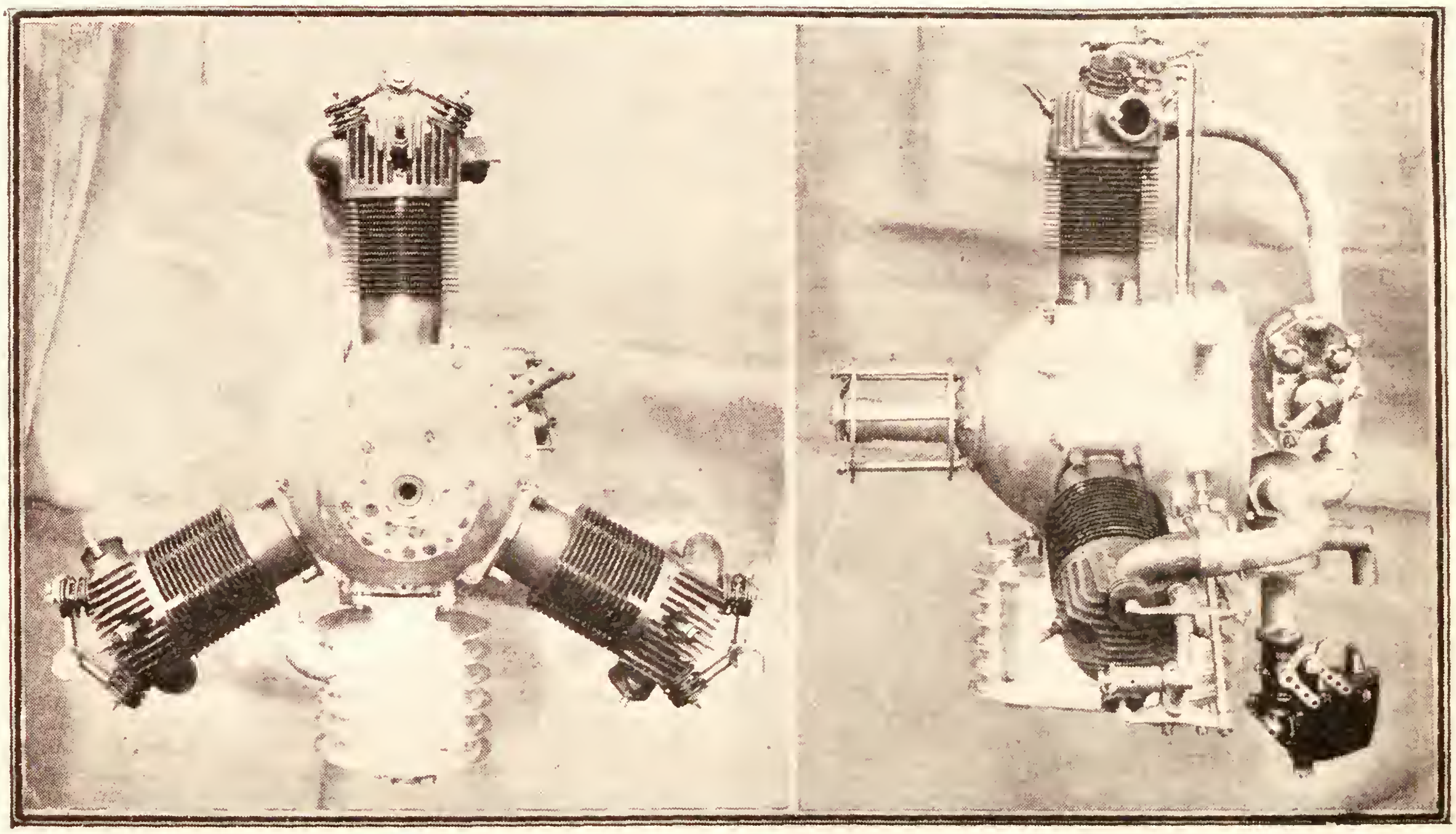
As briefly recorded elsewhere in this issue, Commander F. L. M. Boothby is reviving the idea of forming a club for the encouragement of airship flying. It is quite a long time since Commander Boothby first suggested this scheme, and at the time we welcomed it in FLIGHT as an aid to revive the interest in airships and as a means of, if not training airship pilots, at any rate of giving flying practice to the few who still remain.

Under the new scheme, which we understand Commander Boothby has placed before the Air Ministry, it is suggested that, as but five out of the six light aeroplane clubs originally contemplated have come into being, the Air Ministry has the subsidy intended for one club, *i.e.*, about £3,000, going begging, and that this might be devoted to assist in the formation and operation of an airship club. The idea is quite a reasonable one. We seem to be determined to go on with airships sometime, and that being so we shall want pilots and we shall want crews, and we shall want experience. Such a club as that suggested should do much towards developing the "lighter-than-air" sense (in more ways than one), and thus should be deserving of support. Commander Boothby is reported to have got an option, at £1,500, on the small airship prepared for the Algarsson expedition, so that out of the Air Ministry's £3,000 there should still be a reasonable amount left towards initial expenses in formation of club and preparation of hangar accommodation, which it is hoped to obtain either at Bedford or at Pulham. The scheme does not appear to be at all an unreasonable one, and the Air Ministry might do worse than fall in with Commander Boothby's suggestion. It is likely, however, that this year the existing light 'plane clubs will want a good deal of support, and the Air Ministry may possibly desire to reserve any surplus for assistance in this direction. Frankly we have not overmuch hope of the suggestion being adopted. But as the Navy is now evincing a certain interest in airships, why not let the Senior Service come forward and help the scheme through its initial stages? If airships are ultimately to be handed over to the Navy, this step would seem to be a logical one. The airship members would be "yachtsmen of the air." What more natural than that the Navy should help them a little And the Navy has much more money to play with than has the Air Ministry.

THE BLACKBURNE "THRUSH" LIGHT 'PLANE ENGINE

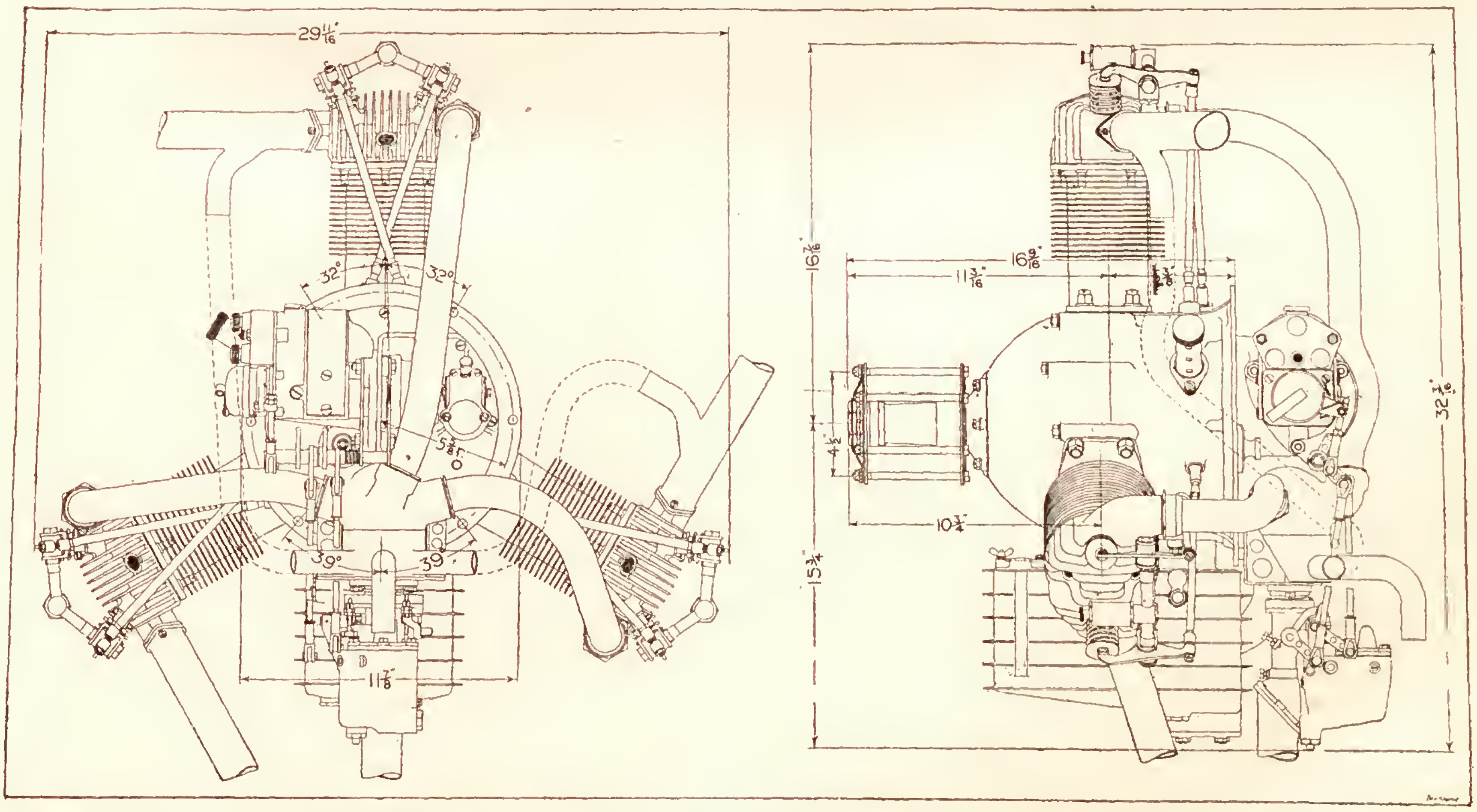
A 3-Cylinder Radial of 1,500 c.c. Capacity

Last week we published two views of the new 1,500 c.c. Blackburne light 'plane engine produced by Burney and Blackburne, Ltd., of Bookham, Surrey, and which has recently passed the Air Ministry's 100 hours' type tests.



THE BLACKBURNE "THRUSH" LIGHT 'PLANE ENGINE: Front and side views. Note the ribbed oil sump below the crankcase.

Generally speaking, the "Thrush," as the engine is called, is similar to the 1924 model, but the capacity has been increased to 1,500 c.c., and improvements have been effected which have enabled the reliability of the engine to be increased to such an extent that it has been, as stated, able to pass what is undoubtedly a very severe test. The Blackburne "Thrush" may now be regarded as a very suitable engine for light 'planes, and its weight is well within the limits set by official regulations, being only 132 lb. including sump, as against the 170 lb. permitted. For this year's light 'plane

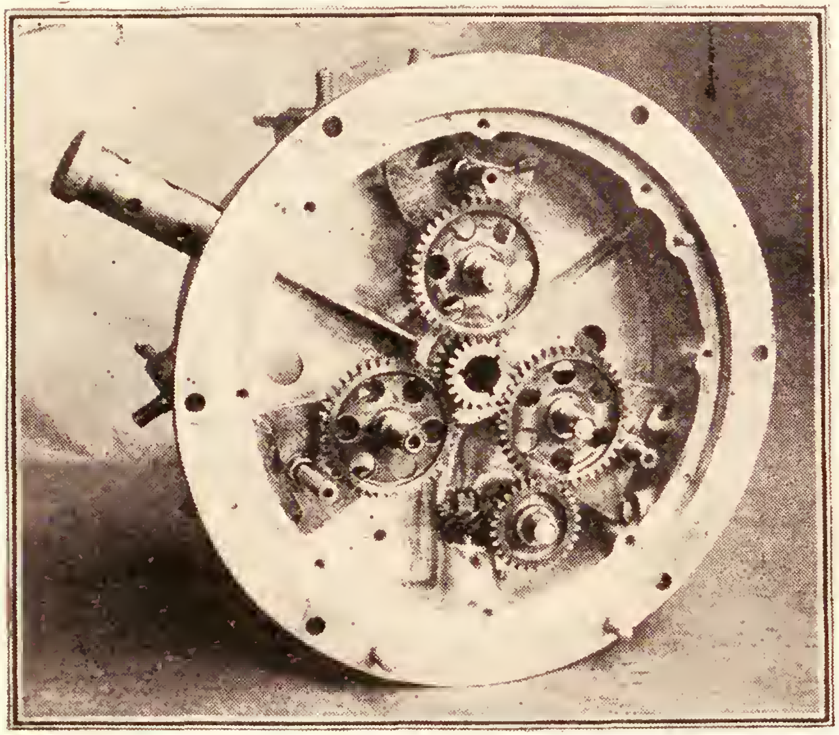


THE BLACKBURNE "THRUSH" LIGHT 'PLANE ENGINE: Installation diagram with main dimensions shown.

competitions the "Thrush" should particularly appeal on account of its low fuel consumption which averages 0·54 to 0·52 pints per horse-power per hour. In the competition the load carried per unit of fuel consumed for the total distance of 2,000 miles is the fundamental basis for the award of marks, and for an engine of less than 40 h.p. the fuel consumption of the "Thrush" can be regarded as very good.

The Blackburne "Thrush" is, as will be seen from the accompanying illustrations, a three-cylinder radial air-cooled, with overhead valves and a large oil sump built on as a separate unit below the crankcase. The latter is a large aluminium casting, generously ribbed, and is built in two halves, with the division placed laterally. The front half of the crankcase is dome shaped, and internally ribbed to give stiffness. In this portion are carried the two main ball journal bearings for the crankshaft, the front one being also a thrust bearing. A plain bearing in the rear half of the crankcase supports the rear end of the crankshaft, upon which is mounted the driving wheel for the valve timing gear, etc., shown in a photograph.

The crankshaft (hollowed for force feed lubrication) is built up in two halves, the crankpin being splined at its rear end where it fits into the rear web, which is slotted so as to enable the pin to be locked in place. The connecting rods are all identical, that is to say, there is no master connecting rod, and sit side by side on the crankpin, roller bearings being employed for the big ends. The pistons are of aluminium, and are of normal type. ☛

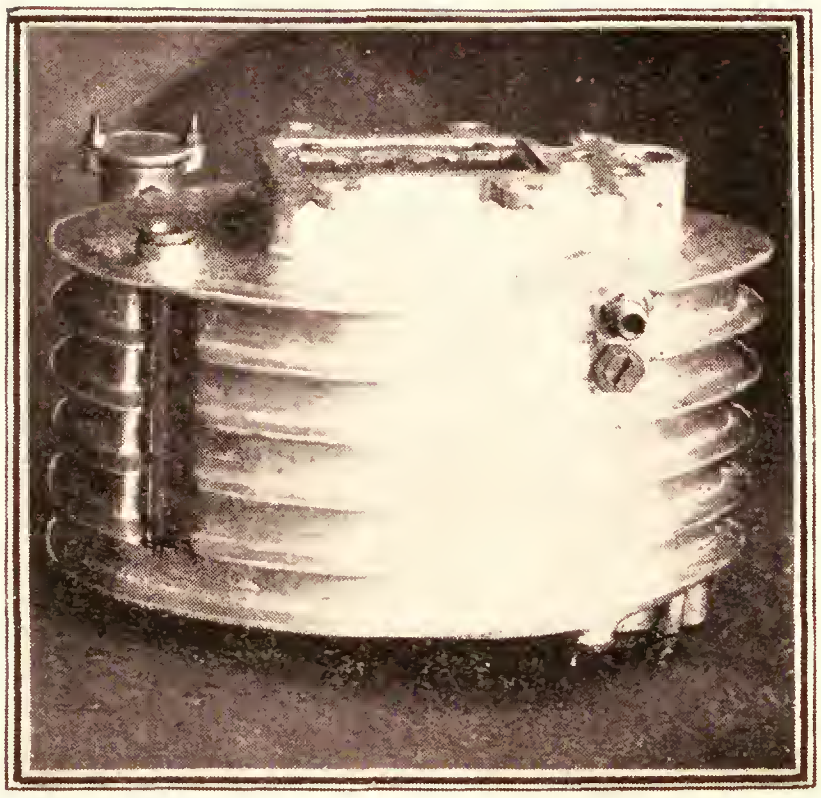


A view inside the timing gear-case of the Blackburne "Thrush," showing the valve gear for the three cylinders, the rockers, and the oil-pump drive.

The timing gear is in the form of a plain spur gear, housed in the back of the rear half of the crankcase, the driving wheel on the crankshaft having the three camshafts and their gears symmetrically disposed around it as shown in a photograph. Here also is seen the helical gear for the oil pump, and the magneto drive. The rear bearings for the three camshafts, auxiliary drive shafts, etc., are in the back cover of the crankcase.

The overhead valves are operated by tappets from the rockers in the timing gear case, and it will be observed that the tappets cross over so as to be more nearly in line with the valve stems and thus reducing the oblique loads on the overhead valve mechanism. The valves are of the tulip type, held on their seating by two concentric coil springs each. These springs are located on the top of the cylinders by the fins of the cylinder heads having shallow grooves to prevent the springs slipping, and at their outer ends the springs are supported on washers, which in turn are held in place on the valve stems by small split collars housed in a recess in the valve stems. The details of this, and the manner of removing valves, are shown in some of our sketches.

A yoke in the shape of a very flat inverted vee braces the upper ends of the pillars supporting the overhead rockers, and also prevents them from twisting. At the same time they serve to convey lubricant from the grease cups to the rocker bearings.



The oil sump of the Blackburne "Thrush" is a separate unit, bolted to the bottom of the crankcase.

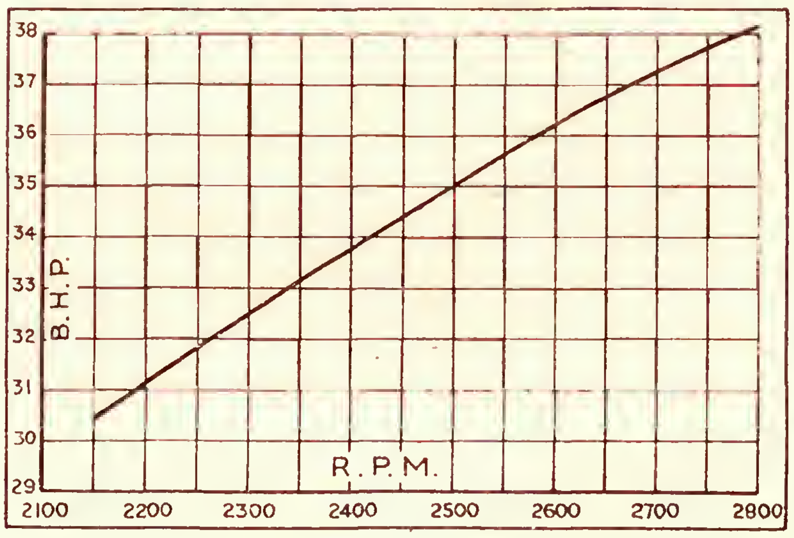
The steel cylinders are secured to the crankcase by four bolts each, and have detachable cast-iron heads with vertical fins running in a fore and aft direction. Six bolts secure the head to the cylinder, a plain copper washer being inserted to make a gas-tight joint. The six bolt by means of which the detachable cylinder heads are attached to the cylinders are dropped through holes in the fins, and a special spanner, forked to slip over the fins, is employed for tightening up the special bolts. The cylinder heads, it will be seen, are of very symmetrical form and should give a combustion chamber of very good shape. The two sparking plugs are placed opposite one another, and both are fired by the same magneto.

The B.T.H. magneto is mounted on a shelf on the back of the cover, and it is to be noted that an impulse starter is provided, so that there should be little difficulty in starting the engine. The carburettor is a Claudel-Hobson, type M.B.P., which is provided with a special patented atomiser, which, no doubt, accounts to a not inconsiderable extent for the very low fuel consumption. It might also be mentioned that the plugs used in the recent Air Ministry type tests were K.L.G. 12-mm. plugs, No. 214.

The "Thrush" is mounted in the aeroplane by six bolts through the flange at the back, the pitch circle for the holes, and their spacing, which is uneven, being shown in the rear view of the installation diagram.

Bolted to the bottom of the crankcase is a large oil sump, with ribs cast externally to improve the cooling. The oil pump draws oil from this sump, through a filter, and delivers it to the bearings, afterwards returning it to the sump through another filter. The sump has a capacity of 7 pints, which should be sufficient for quite long periods of running.

Most of the important overall dimensions of the Blackburne



Power curve of the Blackburne "Thrush."

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27/60 h.p. A.D.C. "CIRRUS" ENGINE.

The 27/60 h.p. A.D.C. "CIRRUS" Engine was the first British Low-powered Aero Engine to pass the Air Ministry 100 hours' Type Test, and has been adopted for use in the de Havilland "Moths" with which the Light Aeroplane Clubs are equipped.

The following opinions of "CIRRUS" owners after some months' running, should be of interest.

"The De Havilland Aircraft Co., Ltd.,
"Stag Lane Aerodrome,
"Edgware.

"21st December, 1925.

(*Extract.*)

"I am sure that you have done extremely well in achieving in such a remarkably short time, the production of an engine which to-day is giving literally no trouble at all.

"There is no doubt that the engine is behaving like one with years of development behind it."

"London Aeroplane Club,
"3, Clifford Street,
"London, W.1.

"17th December, 1925.

"I enclose a table showing the flying carried out by the London Aeroplane Club, from the 19th August to the 30th November, on the two D.H. 'MOTHS,' fitted with 27/60 h.p. CIRRUS engines.

"From this table you will see that flying was carried out on 72 days and that 729 flights were made, resulting in a total flying time of 298 hours 45 minutes.

"We are extremely satisfied with the performance of the two CIRRUS engines supplied by you in the D.H. 'MOTHS.' The only trouble we have experienced with these engines is with the valve seatings, but the modification you made has entirely corrected it.

"I trust that you will find these figures of interest."

"Newcastle-upon-Tyne Aero Club, Ltd.,
"38, Cloth Market,
"Newcastle-upon-Tyne.

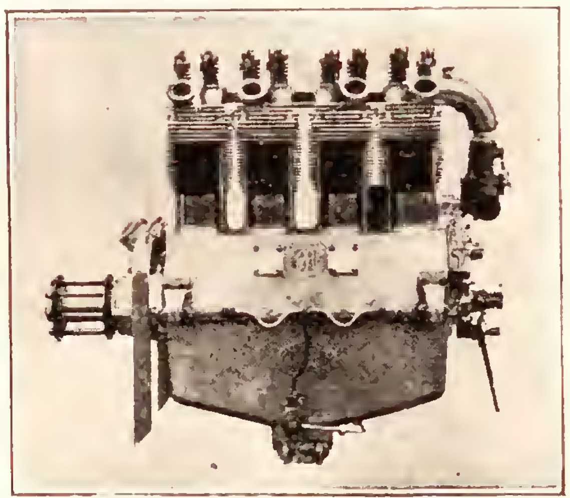
"25th November, 1925.

(*Extract.*)

"The Cirrus engines fitted to the machines have proved exceptionally reliable and economical.

"The only replacements necessary on the two engines have been two new cylinder heads, the valve seatings of which were found by the representative of the A.D.C. Aircraft, Ltd., when carrying out a modification, to have moved an almost inappreciable amount in the cylinder heads. The particular engine in which this very slight defect, which was not noticeable in running, was found had done 49·5 flying hours, and 58 hours total running.

"No other replacements whatsoever have been necessary on either engine, although over 100 hours flying has been done."



27/60 h.p. A.D.C. "Cirrus" Engine.

LONDON TO DUBLIN

The recent fine flight by Colonel The Master of Sempill (including a 70 mile sea crossing), was carried out with a de Havilland "Moth," fitted with an A.D.C. "Cirrus" Engine.

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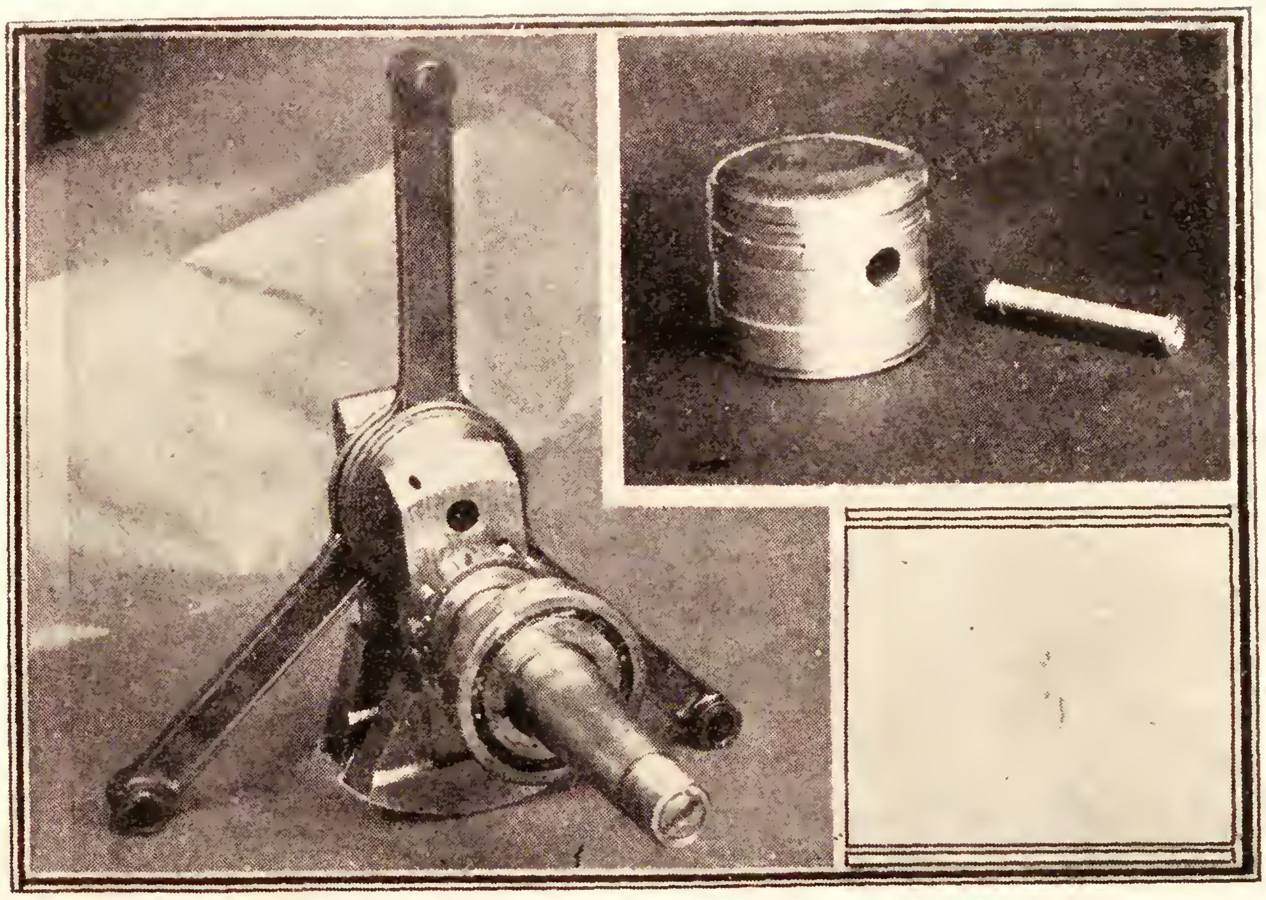
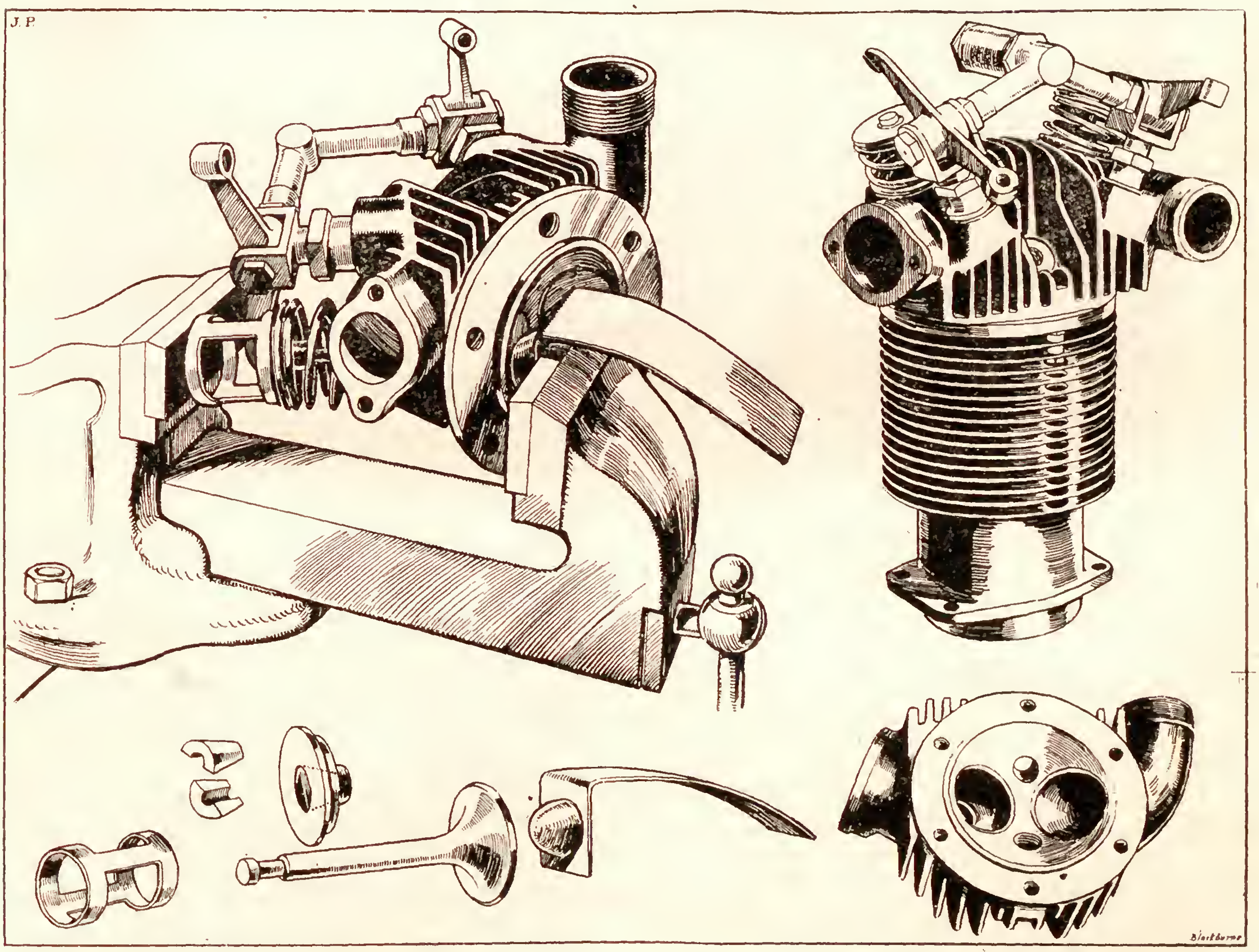
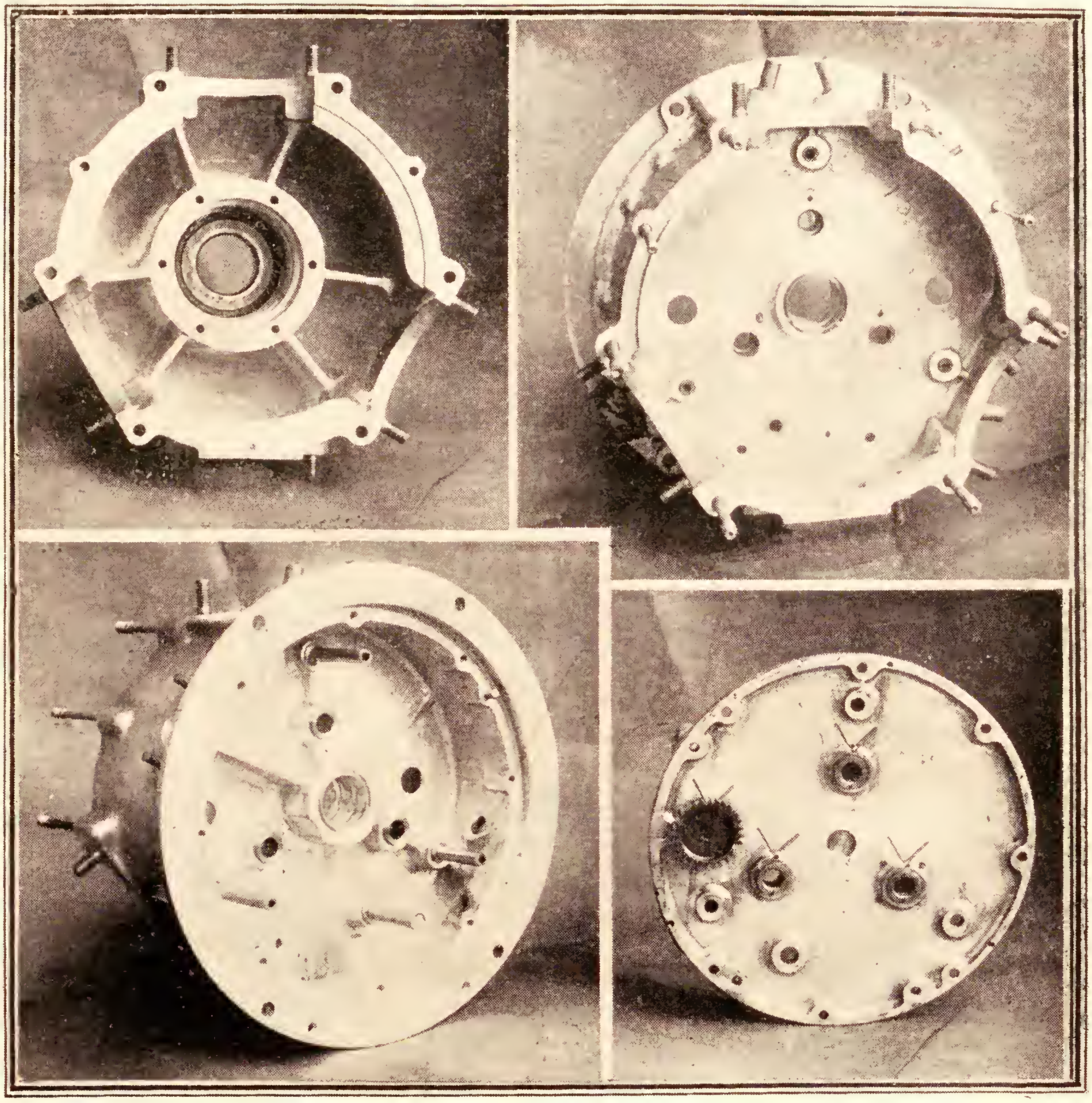


The Blackburne "Thrush": The crankshaft and connecting-rod assembly, and (inset) a piston and gudgeon-pin.



SOME DETAILS OF THE BLACKBURNE "THRUSH" LIGHT 'PLANE ENGINE: On the right, a cylinder, showing the overhead valve gear. Below, a view of the valve seats inside the detachable cylinder head. On the left is shown a cylinder head placed in the vice for removal of the valves. The valve itself, the means employed for securing it, and the special tools used for removing the valve from the cylinder are shown below.



THE BLACKBURNE "THRUSH": The two upper photographs show—On the left, a view inside the ribbed front half of the crankcase. Right, a front view of the rear half of the crankcase. Below, on the left, the same is shown from the timing-gear side; and on the right, the back cover of the engine.

"Thrush" are shown on the accompanying installation diagram. It may be mentioned, however, that the bore is 81 mm. and the stroke 96·8 mm., giving a capacity of 1,494 c.c. The normal speed of the engine is 2,500 r.p.m., which is low enough to allow of direct drive, and yet obtain reasonably good propeller efficiency. At this speed, the engine develops 35 b.h.p. The maximum permissible speed is 2,750 r.p.m., when the power is 38 b.h.p. The weight of the engine, including oil sump, exhaust pipes, induction and ignition system, impulse starter, propeller hub, &c., is 132 lb., corresponding to a specific weight of 3·77 lb./h.p., based on normal power. This figure includes oil sump, exhaust pipes, induction manifold, carburettor, magneto, impulse starter, propeller hub, etc.

Thus, the engine is not exactly a light weight, but its robust and simple construction, coupled with the low fuel consumption should easily outweigh any slight disadvantage due to the weight. The engine is easy to dismantle and overhaul, and its maintenance should present no difficulty to anyone at all used to internal-combustion engines.

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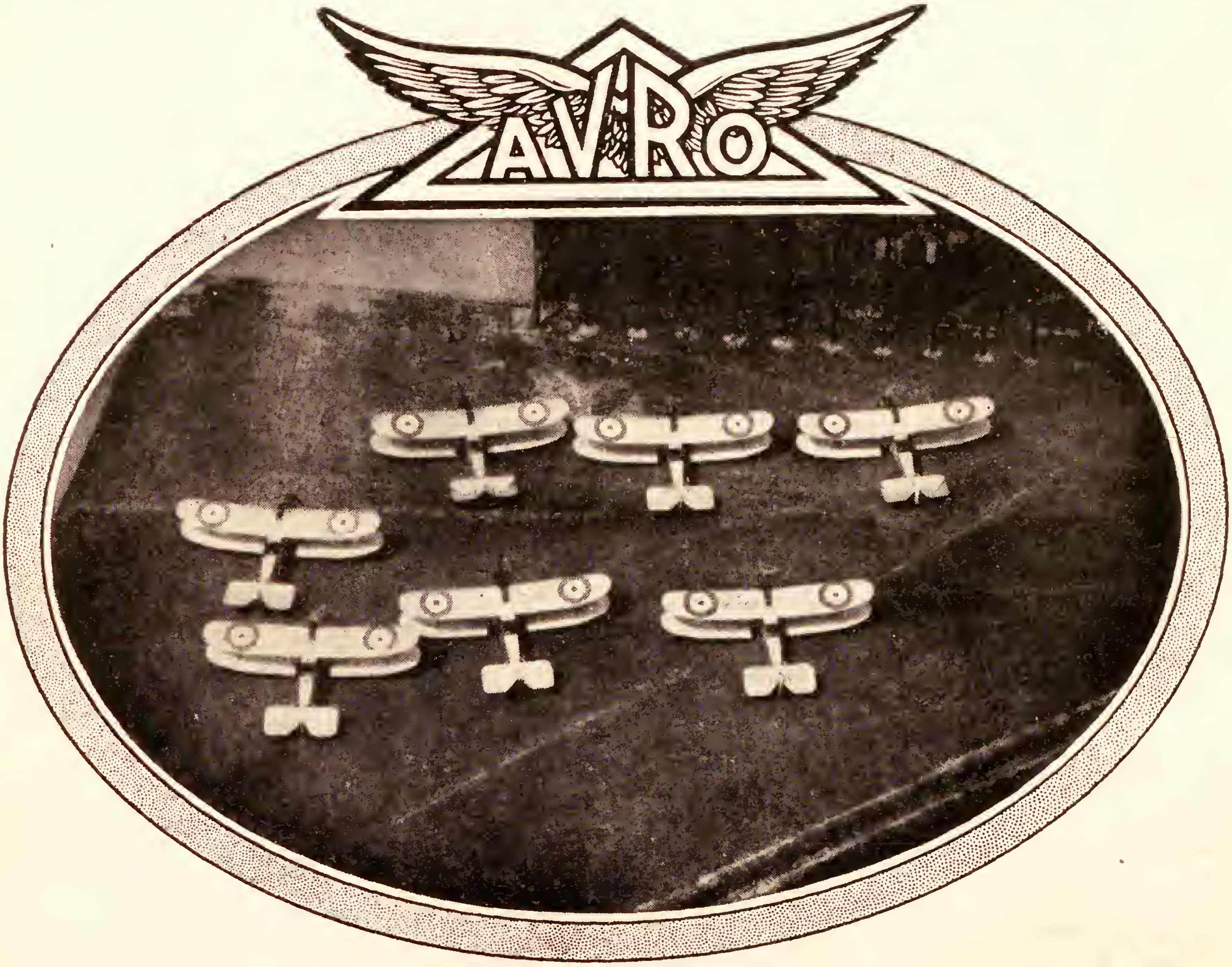
The R.E.P. "Joystick" Claim

The French Court of Cassation has given judgment in favour of the claim for 3,000,000 fr. by M. Esnault Peltrie in connection with his invention of the "Joystick" aeroplane control. This will probably result in further claims and actions, not only in France but in other countries, and some will wonder why it is called a "joy" stick.

American Aeronautical Safety Code Published

The American Aeronautical Safety Code, one of a series of safety codes formulated under the rules of procedure of the American Engineering Standards committee, is now issued. In drafting the code the intention was not to prescribe too closely the acceptable methods of design, construction or operation, but to formulate criteria of good practice that would promote a general agreement and understanding as to acceptable safety standards. The code includes the following parts:—Introductory Part; Part I, Aeroplane Structure, Design, Fabrication and Tests; Part II, Power Plants, Design, Assembly and Tests; Part III, Equipment, Maintenance and Operation of Aeroplanes; Part IV, Signals and Signalling Equipment; Part V, Aerodromes and Airways; Part VI, Traffic and Pilotage Rules; Part VII, Qualifications for Airmen; Part VIII, Balloons (Free and Captive); Part IX, Airships; Part X, Parachutes. It is published and distributed by the Society of Automotive Engineers, Inc., 29, West 39th Street, New York City. The price for single copies or small quantities is $1·50 each; for larger quantities a reduced price will be quoted. Orders should be addressed to the Society of Automotive Engineers.



A Fleet of Avro "Bisons."

THE Avro "Bison" is only one of the wide range of machines manufactured by A. V. Roe & Co., Ltd. It is a Fleet Gunnery Spotter, specially built for the British Air Ministry, and is equipped for taking off from and alighting on a ship's deck.

Inquiries are invited for machines for special purposes or for the supply of standard AVRO products.

A. V. ROE & CO., LTD., Avro Works, Newton Heath, Manchester.
London Office: 166, Piccadilly, W.1. Experimental Works: Hamble, Southampton.

100 hours Air Ministry Type Test for the 29/36 h.p.

“Bristol”

CHERUB AIRCOOLED ENGINE.

LEADING PARTICULARS OF THE CHERUB SERIES III ENGINE.

—o—

Type……Aircooled, horizontally opposed twin.
Cylinders……Aluminium head, overhead valves.
Bore and Stroke…3·54″×3·8″. 90 m/m×96·5 m/m.
Total stroke volume……75 cub. in., 1,228 c.c.s.
Compression ratio……5·5 to 1.
Power at normal r.p.m.……33 B.H.P. at 2,900 r.p.m.
Power at maximum r.p.m.…36 B.H.P. at 3,200 r.p.m.
Propeller……Direct drive left-hand tractor.
Lubrication……Pressure 40 lbs./sq. in.
Oil pump……Duplex gear, 1 scavenge, 1 pressure.
Carburettor……Special Zenith aero model.
Ignition……Dual double pole H.T. magneto.
Sparking plugs……Two per cylinder.
Weight, dry……95 lbs.
Consumptions at normal r.p.m.:—
Fuel……2 gals./hr.
Oil……1 pt./hr.

The ten non-stop runs of ten hours each comprised in the Type Test were completed without any stoppage, adjustment or replacement. During the last hour the engine held 36.6 h.p. at 3,200 r.p.m. Throughout the test, petrol consumption averaged ·586 pts./B.H.P./hr., and oil ·026 pts./B.H.P./hr. After the test the engine was stripped, and the official report states—“The general condition of the engine was excellent.”

The Cherub Series III engine has been developed upon the experience gained with the earlier type, which gained premier awards at every flying meeting in which it took part. It has been completely re-designed, with more robust crankcase, full floating big-end bearing, full pressure system, dry sump and double spur gear pump. The capacity is increased to 1,228 c.c., and a new carburettor and dual ignition are provided.

Orders are now being executed for the supply of this engine and will be filled in rotation.

THE BRISTOL AEROPLANE CO., LTD.,

Telephone:—3906 Bristol.
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Telegrams: “Aviation, Bristol.”

R. M. KINDERMAN
COLLECTION

THE REORGANISATION OF THE ITALIAN AIR MINISTRY

General P. R. Piccio, Chief of Air Staff in Italy.

The steady growth during the past few years of Italian aeronautics has been very marked to all who have studied the progress of aviation in general, so the following notes, from a contributor who is thoroughly conversant in the matter, on the organisation of Italian aeronautics will, we think, be of interest to many.

One of the most important points of the re-formation of the Italian Ministry in October, 1922, was the reorganisation of aeronautics as an independent organ separate from the Army and Navy.

From the time of the armistice to the year 1922, aeronautics were practically abandoned, for reasons of economy and because the firms had stopped all experimental work, owing to lack of orders. There were also political difficulties, as workers refused to co-operate in the building of engines for aircraft, as they considered these organs of war.

At the end of January, 1922, the Air Commission was instituted, headed by His Excellency Mussolini himself, and with the Hon. Finzi as Vice-Commissioner, assisted by His Excellency Mercanti, Chief of the General Direction for Aeronautics, and Colonel Moizo, Military Commander of the Air Force. By June 30, 1924, the Italian Air Ministry had already 66 squadrons in service, while the aircraft constructing firms had presented more than 18 new experimental machines and 4 new types of engine.

The retirement in June, 1924, of Hon. Finzi and His Excellency Mercanti, brought about a considerable change in the Air Authorities and a busy period of reorganisation which ended in June, 1925.

At that time the President of the Ministry, Mussolini, definitely instituted the Air Ministry, on the same basis as that of the Army and Navy Ministries. This definite reorganisation of the Air Ministry now forms part of the general reconstruction of the Military Ministries.

Army, Navy and Aeronautics, up to June, 1925, claimed the most important parts of the funds which the country could afford for the National Defence. In order to stop useless controversy, Mussolini thought it best to assume the control of the three Ministries (Army, Navy and Air) by becoming Secretary for each, and this practically succeeded in creating that unique Ministry of National Defence which has already been proposed in our own and other countries as the most logical solution of the military problem.

The co-ordination of the three Ministries is, therefore, due to the fact that President Mussolini is at the same time Secretary for the three Ministries (Army, Navy and Air).

A second innovation, which is perhaps more important, is the appointment of a Chief of General Staff which coordinates the three Offices of the Army, Navy and Aeronautics, so that in case of war the work of the three Offices of the Staff would not be separate and independent from each other as hitherto.

So as to give an exact idea of the dependency and relationship of the various heads and officers of military administration, we would refer the reader to Figs. 1 and 2. Fig. 1 shows the divisions of the Italian National Defence; Fig. 2 refers to the Air Ministry only.

Italy has been the first definitely to carry out the unification of military activities, and it is hoped that this unification will permit considerable economy. For the present, the service of the buildings, the medical service and the chemical service have been united.

The reconstruction of the Air Ministry can, therefore, be divided in three periods: The first started in January, 1923, and ended October 31, 1923, with the result of a first group of squadrons (25) with newly-built machines but of old types, dealing at the same time with the Army and Navy so as to establish the independency of the Air Service.

In the second period, which ended on October 31, 1924, the number of squadrons was increased to 66, and tests of many different experimental machines were made in order to improve the construction of the engines, etc.

The third period, which ended on October 31, 1925, showed the result of an increase in the number of squadrons up to 90 and the bureaucratic organisation of the Air Ministry on the same basis as that of the Army and Navy Ministries.

In June, 1925, General Alberto Bonzani was nominated Assistant Secretary of the Air Ministry, and General P. R. Piccio, the Italian Ace, was appointed Chief of the Air Staff.

The problem of the Air Ministry, like that of the Navy, is

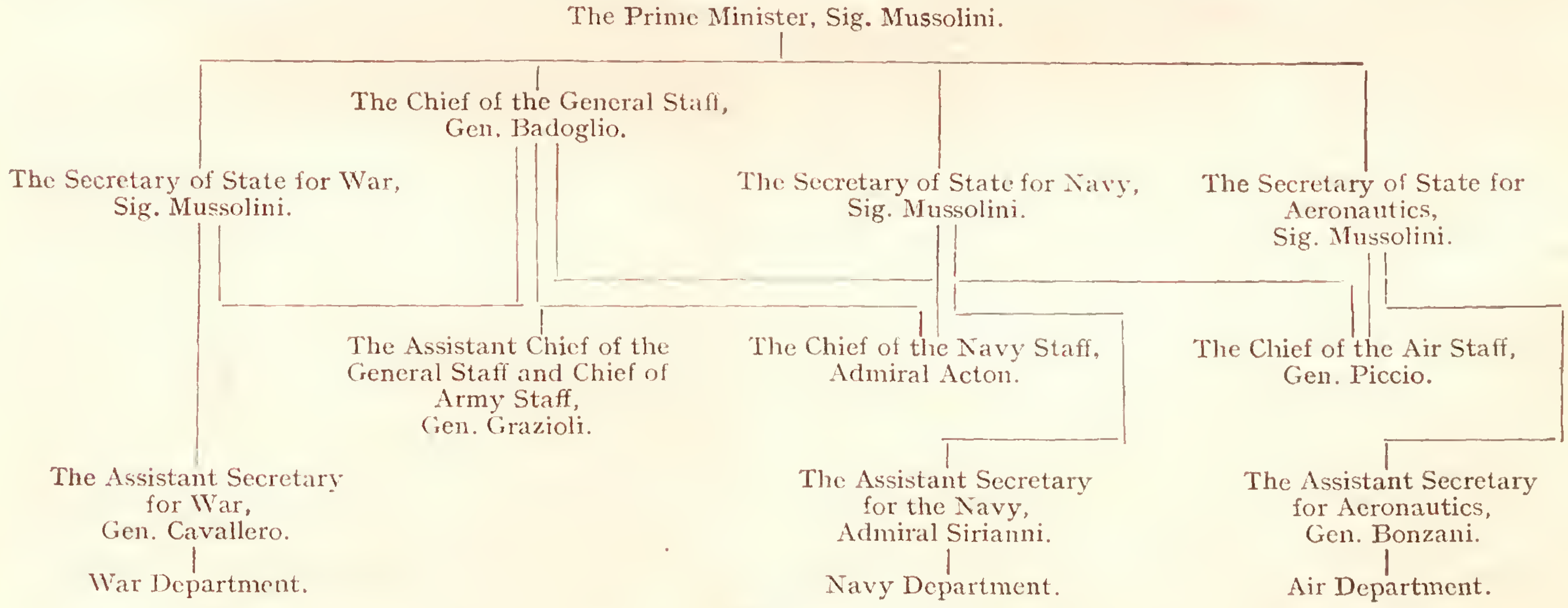
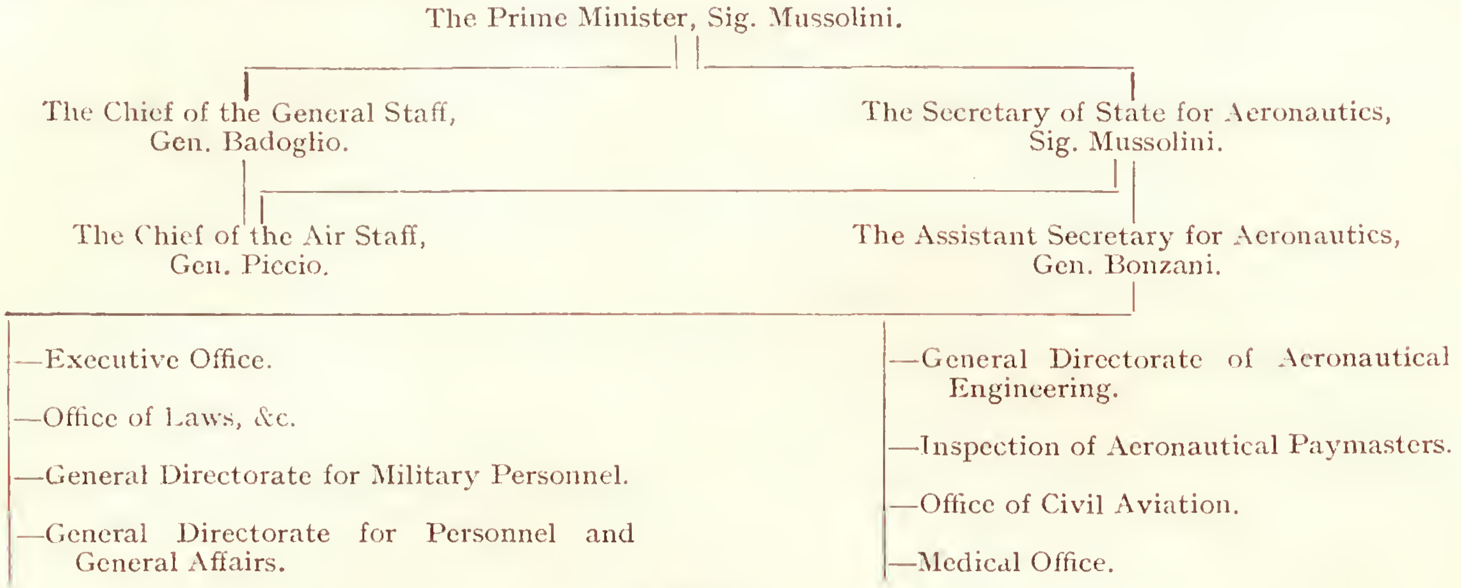

The Prime Minister, Sig. Mussolini.
The Chief of the General Staff, Gen. Badoglio.
The Secretary of State for War, Sig. Mussolini.
The Secretary of State for Navy, Sig. Mussolini.
The Secretary of State for Aeronautics, Sig. Mussolini.
The Assistant Chief of the General Staff and Chief of Army Staff, Gen. Grazioli.
The Chief of the Navy Staff, Admiral Acton.
The Chief of the Air Staff, Gen. Piccio.
The Assistant Secretary for War, Gen. Cavallero.
The Assistant Secretary for the Navy, Admiral Sirianni.
The Assistant Secretary for Aeronautics, Gen. Bonzani.
War Department.
Navy Department.
Air Department.

Fig. 1.

essentially one of staff and material. In the Italian Air Force men enlist and are instructed in the following ways:

Pilots: These are Officiers and Petty Officiers who come from the Air Academy or by direct admission with the grade of Lieutenant or by enlisting with the grade of Petty Officier.



The Prime Minister, Sig. Mussolini.

The Chief of the General Staff, Gen. Badoglio.

The Secretary of State for Aeronautics, Sig. Mussolini.

The Chief of the Air Staff, Gen. Piccio.

The Assistant Secretary for Aeronautics, Gen. Bonzani.

—Executive Office.

—Office of Laws, &c.

—General Directorate for Military Personnel.

—General Directorate for Personnel and General Affairs.

—General Directorate of Aeronautical Engineering.

—Inspection of Aeronautical Paymasters.

—Office of Civil Aviation.

—Medical Office.

Fig. 2.

Engineers: The aeronautical engineers, who form the Corps of Air Engineers, are recruited from the Civil Service Schools of Engineering and take a special course of instruction. They must also qualify for a pilot licence.

Technical Men: These are taken from the Military Schools, and the men who pass the necessary qualifications reach the grade of Petty Officer. The best are made Officiers (non-commissioned) and can reach the grade of Captain.

Material: Machines and engines are built exclusively by the civil firms, who also carry out the experimental work. The Government has only one establishment—that for the construction of airships and kite balloons.

It may, perhaps, be of interest to note the differences between the Italian and the British Air Ministries. The Italian Ministry differs mainly in the following:

Technical questions regarding the Staff are handled by the Air Engineers Corps, which does not exist in the British Air Force. On the other hand the medical service is carried out by Army and Navy Surgeons, whereas our own Air Force has its own medical service.

Whilst the meteorological section is, in England, attached to the Air Ministry, in Italy it is, instead, independent of the Air Force.

There are but slight differences as regards material:—Italian pursuit 'planes have, it is claimed, a higher speed and attain greater altitudes, but have a less efficient armament than the British machines.

The Italian night bombing 'planes must attain a height of 12,000 ft., which allows the weight of the machine to be kept comparatively low, whilst the day-bombers are called upon to show a slightly higher speed than that required of the British day-bombers.

On the other hand Italy does not possess a two-seater fighter, and employs for observation purposes a type of 'plane similar to the D.H./9.A.

The Italian Air Force has in service some single-seater seaplanes, but has no cruiser sea-planes. Although at present Italy has no aircraft carriers, it has now been decided to equip battleships with light machines—the catapult system for the launching of seaplanes from the decks of battleships having been tested with good results.

In conclusion, while the Italian Air Ministry aims at maintaining the largest possible number of squadrons with a minimum of experimental and administrative work, our own Air Ministry devotes considerably more attention to these two latter sides.

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LIGHT 'PLANE CLUB DOINGS

London Aeroplane Club

Flying has been very restricted during the week. Saturday was the first time the weather was at all possible, and we managed to get in just over six hours' flying. On Sunday it rained all the morning, and cleared up a little in the afternoon to allow about one hour's instruction.

The following members had flying instruction:—Col. Turner, E. S. Brough, C. E. Murrell, E. K. Blyth, A. P. Hunt, V. H. Doree, D. Kittell, H. R. Thomas, L. E. Vincent. The following members flew solo: P. G. Lucas, Major Beaumont, Mrs. Eliott-Lynn, Squad.-Leader M. E. A. Wright. The total flying for the week was 7 hours 30 minutes.

Members are reminded of the dance at the Suffolk Galleries, Suffolk Street, W.1, on Wednesday, January 13, starting at 9 p.m. Tickets, 10*s*. 6*d*., may be obtained from the Pilot Instructors, at the aerodrome, or at the offices, 3, Clifford Street, London, W.1.

The Lancashire Aero Club

The weather has been bad, flying has been possible on only Thursday, Friday and Saturday.

Mr. Cantrill gave dual instruction on L.R. to:—A. Jowett 40, A. Macnair 25, C. Parker 30, P. Michelson 20, C. Colley 10.

Tests occupied 25 minutes. Total time flown 2 hours 5 minutes. Five persons had instruction.

The Newcastle-upon-Tyne Aero Club

Flying report for week ending Sunday, January 3, 1926:—Total times. G-EBLX 9.01, G-EBLY 2.32, total 11 hours 33 mins.

The following had dual instruction, under Major Packman:—Messrs. H. H. Leech (2 hours 45 mins.), J. M. Campbell (17 mins.), A. Bell (15 mins.), J. D. Irving (2 hours 2 mins.), L. Smith (32 mins), J. S. Jardine (15 mins.). Secondary dual, Mr. R. N. Thompson (35 mins.). Solo, Mr. R. N. Thompson, 1 hour 50 mins. "A" pilots, Mr. W. Baxter Ellis (15 mins.), Mr. P. Forsyth Heppell (17 mins.). Passengers: Mr. Harle (15 mins.), Mr. J. W. Holmes (15 mins.), Mr. Kerr (15 mins.), Mr. W. Walker (15 mins.), Mr. Nicholson (10 mins.), Mr. Kerr, Junior (15 mins.).

Mr. J. W. Holmes, who will be remembered as first President of the North East Coast Aero Club, visited the aerodrome on Monday, and expressed surprise on seeing the completeness of the equipment of the Club, and was very well pleased with the flight he had with Major Packman. Mr. Holmes is a member of the Yorkshire Club now.

Mr. J. M. Davidson, who has spent the past five years in America and only returned to England on Christmas Eve, visited the aerodrome on Sunday and decided right away to become a member, which he did, and had a 15 minutes' joy ride in the rain. The members present were very much interested in the descriptions he gave of the manner in which civil aviation is carried in the United States. It was felt that he should feel quite at home in Moths, in spite of all the examinations, tests and certificates required in connection with flying in this country.

The manner in which the exhaust pipe affects the running of an engine had possibly not been fully appreciated previous to fitting a new one to LX. Major Packman states that the engine now "runs like a Rolls Royce. This is a distinct improvement upon the "Ford-like rattle" of the old pipe in its later days. It fell off almost at the moment the delivery sheet was being signed in respect of the new one, so that extravagance cannot be charged to the staff of the club.

Carburettor trouble was experienced by Mr. Jardine (Mr. J. Bell, passenger) when proceeding to the aerodrome on Sunday morning, in his motor car. Members who observed, on returning to the city a day or two previously, two persons pushing a car in the direction of Newcastle, strongly suspect that the same car had developed similar trouble and was then being assisted by the same crew.

Mr. P. Forsyth Heppell and Mr. N. S. Todd have now received their "A" licences. (Ex-war pilots who have re-qualified.)

Some 40 members and friends attended the New Year's Eve dance at the Aerodrome and spent a very happy time.

Flying Report from Commencement to December 31, 1925

Month.	Total		Instruction Dual Control		Solo Flying		Tests		Joy Rides	
	Flts.	Flying Time	Flts.	Hrs.	Flts.	Hrs.	Flts.	Hrs.	Flts.	Hrs.
		h. m.		h. m.		h. m.		h. m.		h. m.
Sept. ...	63	16 14	26	7 05	9	2 10	4	0 35	24	6 24
Oct. ...	100	42 32	53	22 21	11	3 15	4	0 20	32	16 46
Nov. ...	192	80 05	109	55 41	25	12 36	13	1 20	31	6 26
Dec. ...	136	67 20	64	43 45	22	10 21	15	1 55	19	5 09
Total ...	491	206 11	252	128 52	67	28 22	36	4 10	107	34 45

Flying by "A" licensed members is shown under heading Solo for September and October. The totals for November and December are as follows:—November, 14 flights, 4 hours 2 mins.; December, 16 flights, 6 hours 10 mins. (Included in totals in above table.)

The first machine was delivered to the Club on September 15, the second on October 7. Instructors—one. Ground engineers—one.

THE Napier "Lion" aero engine has proved itself supreme.

Supreme in reliability, performance and all-round efficiency.

In care in construction and quality of materials, the Napier cannot be excelled —that is why the Napier is so consistently good—(16 Napiers in use by Imperial Airways have covered over 100,000 miles each and are still in service).

Again—the Napier is British. Designed by British brains, produced from British materials by British labour.

The Napier in every direction possesses the British characteristics of thoroughness and reliability.

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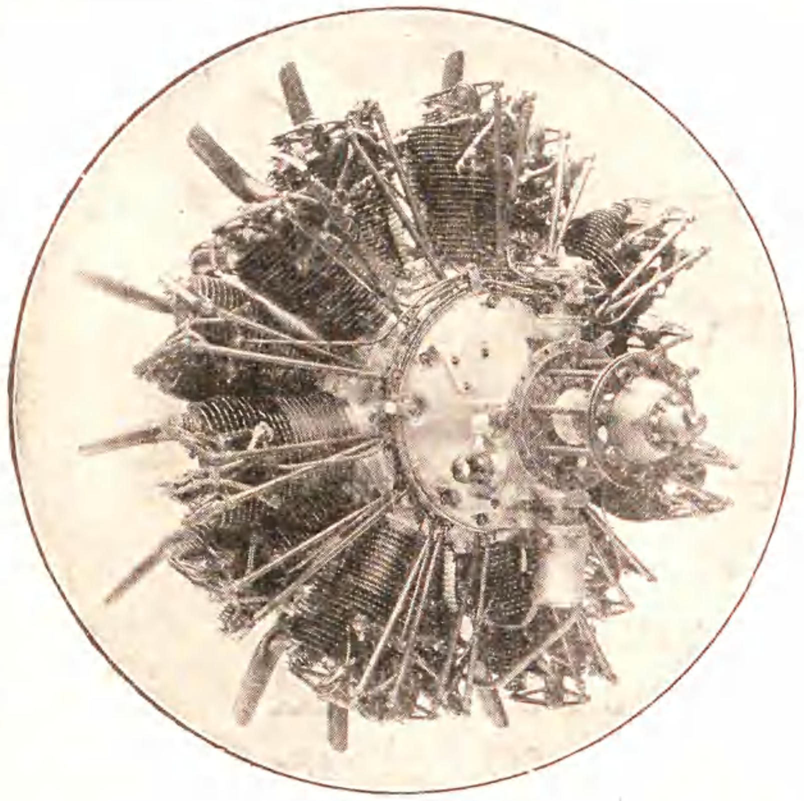
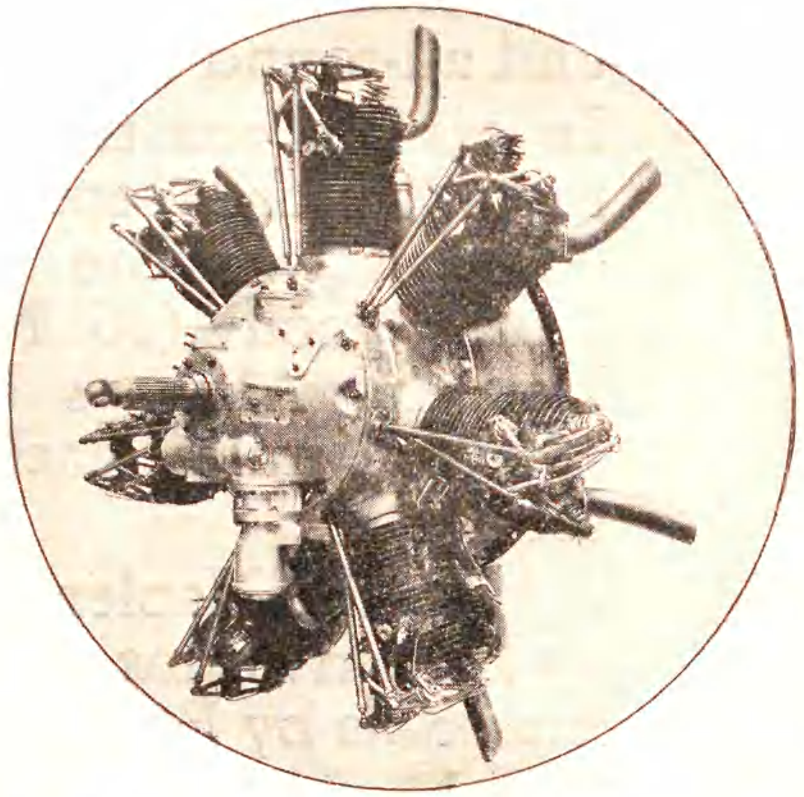


The
JAGUAR
14 Cyl. Radial
Aircooled Engine
385-425 h.p.
Weight 760 lbs.

The
LYNX
7 Cyl. Radial
Aircooled Engine
180-200 h.p
Weight 460 lbs.



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(Allied with Sir W. G. Armstrong Whitworth & Co., Ltd.)
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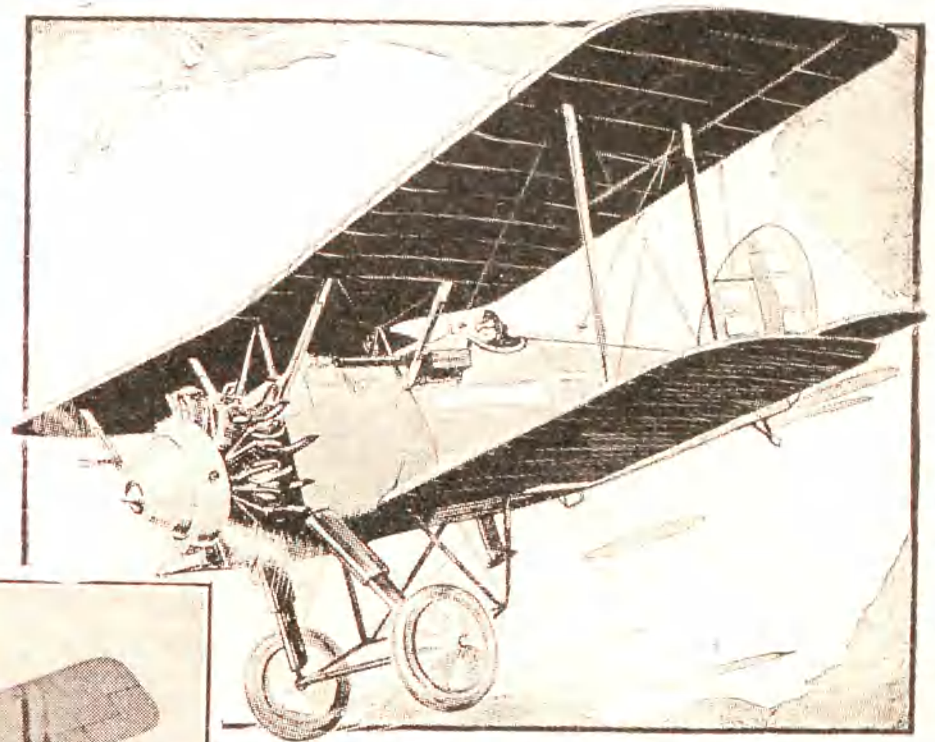
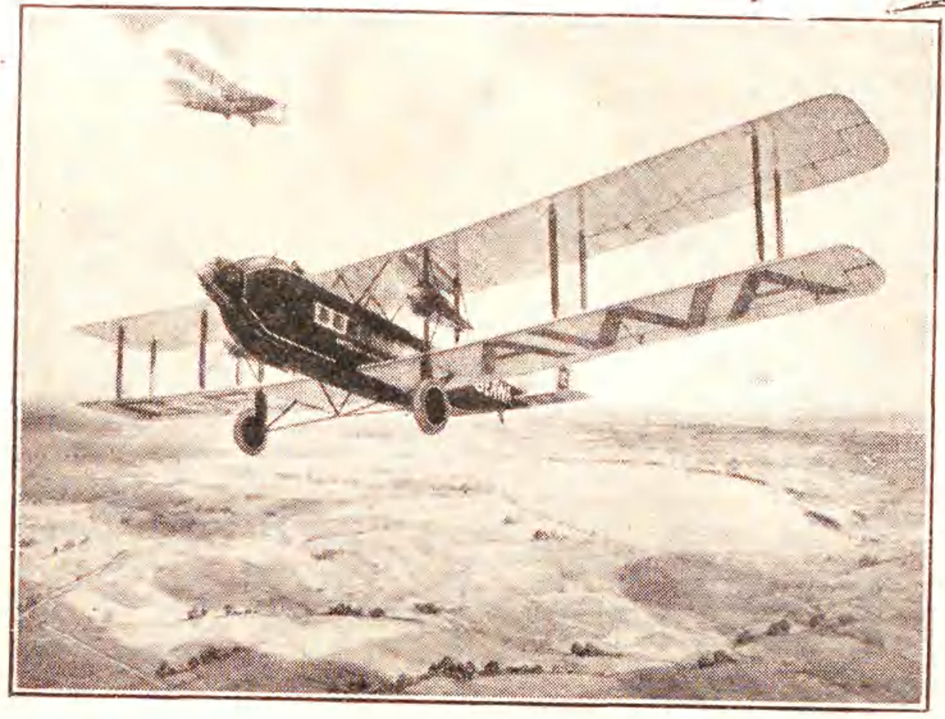
The
SISKIN
Single Seater
Fighting Scout
fitted with
JAGUAR
Engine.





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The Blackburn 'VELOS' torpedo bomber.
The result of 17 years experience & research.

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Olympia, Leeds, England. 'Grams: Propellers Leeds'

AERONAUTICAL RESEARCH COMMITTEE REPORTS

FROM the number of enquiries we receive it appears that there is a desire in aircraft circles to know approximately the contents of the various technical publications of the Aeronautical Research Committee. All the aircraft firms probably receive these reports regularly, whether or not they contain anything of immediate interest or utility. In the case of draughtsmen, however, and others interested in aeronautics, who can hardly be expected to purchase all the reports, the problem of deciding whether any publication interests him is often a difficult one. As it is obviously desirable that the knowledge of aeronautics should be made available to all who take an interest in the subject, we have arranged with the Air Ministry to publish in FLIGHT summaries of all the technical publications as soon as these are issued, or shortly before they are published. All A.R.C. publications can be purchased from H.M. Stationery Offices at Adastral House, Kingsway, London, W.C.2; 28, Abingdon Street, London, S.W.1; York Street, Manchester; 1, St. Andrew's Crescent, Cardiff; 120, George Street, Edinburgh, and through any bookseller.

The Rolling and Yawing Moments of an Aerofoil in Straight Flight. By H. Glauert, M.A. Presented by The Director of Scientific Research. R. & M. No. 980. (Ae. 193). (5 pages.) July, 1925. Price 3*d*. net.

A difficulty inherent in almost all present-day aeroplanes is the fact that the use of the ailerons imposes on the aeroplane a yawing moment as well as a rolling moment. This difficulty has been overcome by the slot-and-aileron control which is described in R. & M. 968 (Full-scale tests of a new slot-and-aileron lateral control. By H. L. Stevens). The present report deals with the method of calculating this yawing moment for a given amount of roll on a conventional aeroplane, using an analysis of the same type as that developed by Prandtl in his Vortex Theory of Aerofoils.

The yawing moment is due partly to the profile drag, and partly to the induced drag of the aerofoil, and calculations of the induced yawing moment for certain special cases are given in recent papers by Munk and Scheubel.

The analysis of the problem by means of Fourier series leads to a simple solution in the general case, and the relationship between the rolling moment and the induced yawing moment referred to wind axes is found in terms of the load distribution across the span of the wing.

The induced yawing moment can be reduced to some extent by the use of tapered wings whose tip chord is less than half the central chord, but the possibility of obtaining no yawing moment about the wind axes depends on some device, such as the slot-and-aileron control which introduces a profile yawing moment of the opposite sign to the induced yawing moment.

An Experimental Investigation into the Properties of Certain Framed Structures having Redundant Bracing Members. Report No. 3. By Prof. A. J. Sutton Pippard, M.B.E., D.Sc., and G. H. W. Clifford, M.Sc. R. & M. No. 977. (Ae. 191.) (12 pages and 1 diagram.) September, 1925. Part 4.—An Experimental Investigation of the Applicability of the Principle of St. Venant to a braced tubular framework. Price 6*d*. net.

The problem of redundancy is common to all engineering construction, but it is not known how far the redundancy affects the strength as a whole. A long research on this subject was commenced eighteen months ago, and two previous papers have been published as R. & M. Nos. 948 and 971.*

All the experiments have been carried out on a braced tubular framework, three bays in length, each bay being hexagonal, as the theoretical equations for this case had been worked out and published in another paper, R. & M. 800.†

The conditions of the present experiment were designed to accord with the Principle of St. Venant so as to determine the effect of the number and disposition of redundancies on its operation.

The experiments show that with efficient bracing in the plane of the applied load system the stresses tend quickly to become independent of the arrangement of that system, and with additional bracing elsewhere a much quicker equalization of stress is produced.

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* R. and M. 948 comprises Parts 1 and 2 of the investigation. R. and M, 971 comprises Part 3.

† R. and M. 800. "Report of the Airship Stressing Panel."

ROYAL AERONAUTICAL SOCIETY

(Official Notices)

Conversazione.—Sir Samuel Hoare, Secretary of State for Air, has kindly consented to attend the Society's Conversazione on Tuesday, January 12, which is being held to celebrate the Society's sixtieth birthday. H.I.H. Prince Chichibu will also be present. Members and their friends will have an opportunity of inspecting the wonderful collection of exhibits in the Aeronautical Section of the Science Museum, which are the most numerous and representative of any collection in the world. The String Band of the Royal Air Force will play during the evening and refreshments will be provided.

Lecture.—The first lecture of the second half of the Sixty-First Session is being held to-day, January 7, at 6.30 p.m. in the Library at 7, Albemarle Street, W.1, when Professor A. J. Sutton Pippard, D.Sc., F.R.Ae.S., will read a paper on "The Experimental Stress Analysis of Frameworks with Special Reference to the Problems of Airship Design."

Programme of Lectures.—Particular attention is drawn to the change of time of the Society's lectures, from 5.30 p.m. to 6.30 p.m.

The following programme has been arranged:—

Thursday, January 21, 6.30 p.m.—In the Library. Lecture, "The Schneider Cup Race, 1925," by Major J. S. Buchanan, Associate Fellow.

Thursday, February 4, 7 p.m.—Joint Meeting with Inst. Automobile Engineers at the Royal Society of Arts. Lecture, "American Aircraft Engine Development," by Mr. C. L. Lawrance.

Thursday, February 25, 6.30 p.m.—In the Library. Lecture, "Long Distance Aeroplane Flights," by Mr. A. J. Cobham.

Thursday, March 4, 6.30 p.m.—In the Library. Lecture, "The Development of Airship Mooring and Handling," by Major G. H. Scott, G.B.E., A.F.C., Associate Fellow.

Thursday, March 18, 6.30 p.m.—In the Library. Lecture, "Handling Aeroplanes in Fog," by Flight-Lieut. H. Gooch.

Thursday, April 15, 6.30 p.m.—In the Library. Lecture, "The Tailless Aeroplane," by Capt. G. T. R. Hill, Associate Fellow.

Thursday, April 29, 6.30 p.m.—In the Library. Lecture, "The Results of Recent Airship Flight Tests," by Lieut.Col. V. C. Richmond, O.B.E., Associate Fellow.

Students' Section—

Thursday, January 28, 6.30 p.m.—In the Library. Informal Discussion on "Air Travel." Mr. Handley Page, Fellow, in the Chair.

Saturday, February 6.—Visit to Croydon Aerodrome. Meet at Trust House Hotel Entrance at 3.0 p.m. sharp. Captain H. R. Gillman, Associate Fellow, will conduct the party round.

Thursday, February 18, 6.0 p.m.—In the Library. Lecture and Discussion, "Bernoulli and Aerodynamics," Mr. M. S. Hooper.

Saturday, February 27.—Visit to the de Havilland Aircraft Company's Works at Stag Lane Aerodrome.

Thursday, March 11, 6.0 p.m.—In the Library. "Experimental Flying from the Pilot's Point of View," by F/O. R. L. Ragg.

Thursday, March 25, 6.0 p.m.—In the Library. Lecture and Discussion "Stalled Flying" by Mr. S. S. Hall.

Thursday, April 8, 6.0 p.m.—In the Library. Lecture (to be announced later).

Further visits to be arranged for May and June.

Will those Students who wish to take part in any visit kindly let the Secretary know as early as possible, so that the necessary arrangements can be made.

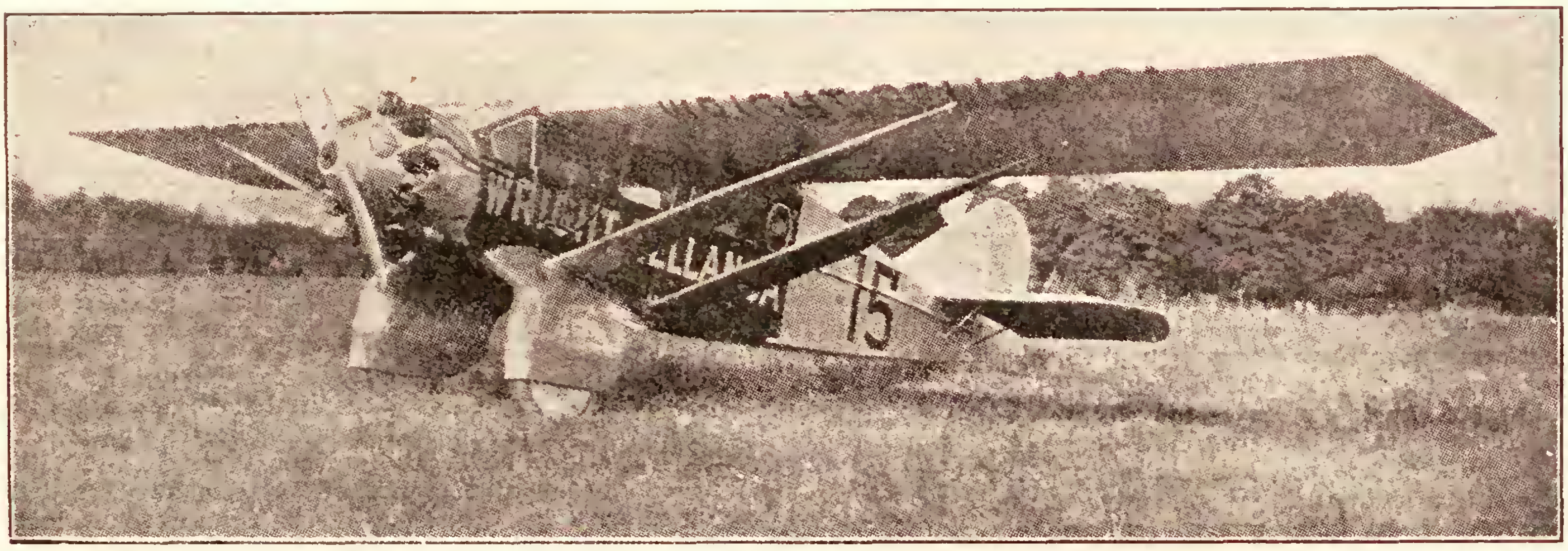
J. LAURENCE PRITCHARD, *Honorary Secretary.*

THE WRIGHT-BELLANCA SIX-SEATER

An American Commercial Cabin Machine

An American commercial aeroplane that gave rise to a certain amount of interest on the occasion of the last New York Air Meet, held in October, during which it obtained first place in the efficiency test in Event No. 5 (Aviation Town and Country Club of Detroit Trophy Race) was the Wright-Bellanca—a six-seater, built around the 200 h.p. Wright "Whirlwind" engine.

The importance of speed in commercial work is one of the primary factors in the practical utilisation of the aeroplane over other methods of transport. It is interesting to note, therefore, that the Wright-Bellanca attained an average speed over the two-mile course at Mitchel Field, with pilot and five passengers, of 138 m.p.h.—considerably higher than the performance expected by the designer himself.



THE WRIGHT-BELLANCA SIX-SEATER: An American commercial aeroplane fitted with a 200 h.p. Wright "Whirlwind" engine. The wing-struts also contribute to the lift.

This new machine was designed by Mr. G. M. Bellanca, who has been responsible for several other successful designs—a low-powered biplane built in 1918 and a cabin-type monoplane (or, to be exact, a sesquiplan) on similar lines to the machine under review built in 1922, and which was described in Flight for September 28, 1922.

Mr. Bellanca severed his connection with the original Bellanca firm some years ago, and the new Wright-Bellanca is being produced by the Wright Aeronautical Corp. of Paterson, N.J., who announced a short while back, that they could put this machine, including engine, on the market for about $12,000, and that orders were then being booked for delivery next spring. This is an indication that the machine has got beyond the experimental stage, and is, in fact, an advanced and improved version of the model produced in 1922.

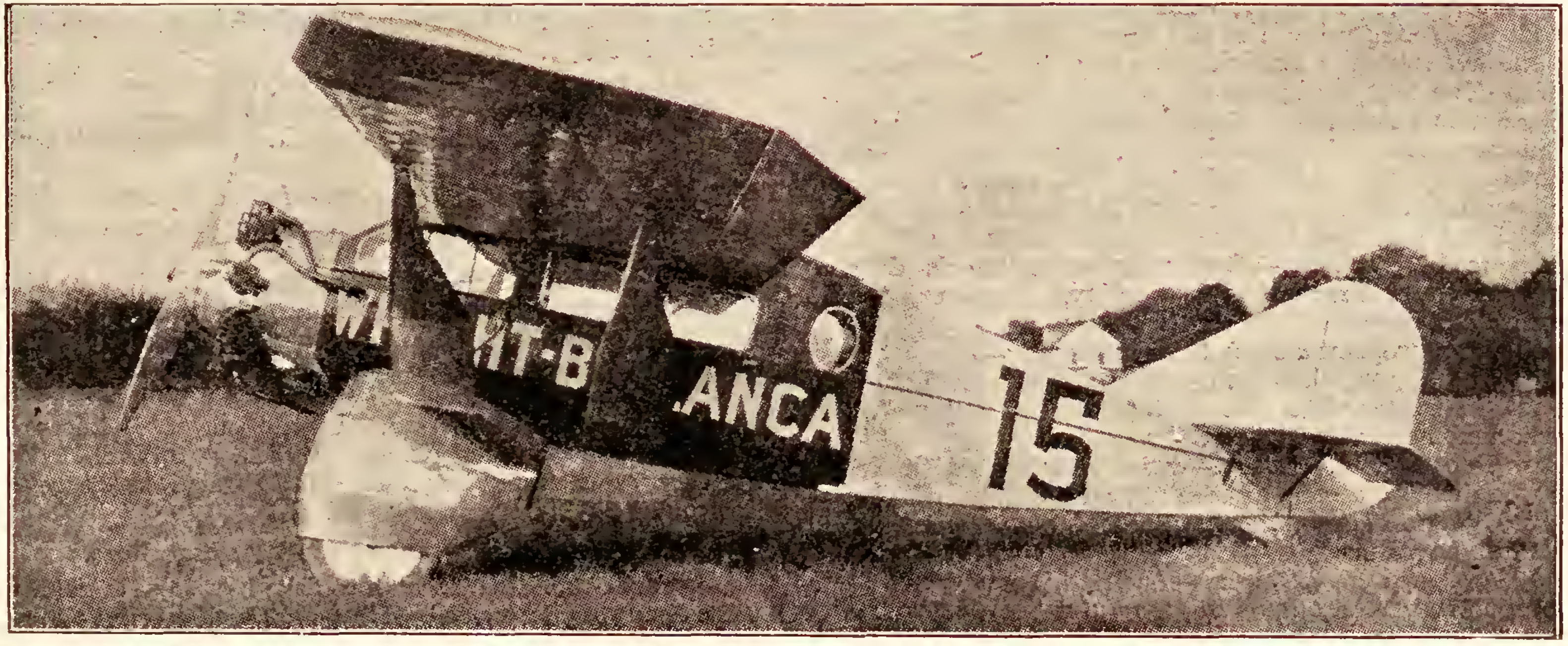
It will be remembered that the latter, also an air-cooled job, put up some noteworthy records and established for itself an excellent reputation. The new model, however, besides having a more powerful engine and some 5-ft. more wing span, possesses many important improvements and refinements.

The Wright-Bellanca is a tractor cabin-fuselage monoplane, with fairly thick-section wings mounted on the top of the fuselage, and braced by struts. There are two struts for the entire external bracing of the wing on either side, and a somewhat unique feature of these struts—which extend from the lower longerons of the fuselage up to the wings at a point about one-third the total wing-span, from the tips—is that they also form lifting surfaces. It would seem that this form of wing bracing has given entire satisfaction in practice, and is likely to come into more general use when the wings are not of the true cantilever form.

In designing this machine very careful provision for safety features was made, including low landing speed, good vision, the elimination of fire hazard, good gliding angle (12½ to 1), excellent controllability at low speeds, wide wheel track, high wing clearance, and high safety factors throughout.

The cabin is exceptionally roomy and is of the totally-enclosed type, the pilot being located high up right in front, immediately forward of the leading edge of the wings, where he has a remarkably good range of vision in all directions—except, perhaps, directly to the rear. Large windows are provided in the main part of the cabin, access to which is obtained by means of a door in the side.

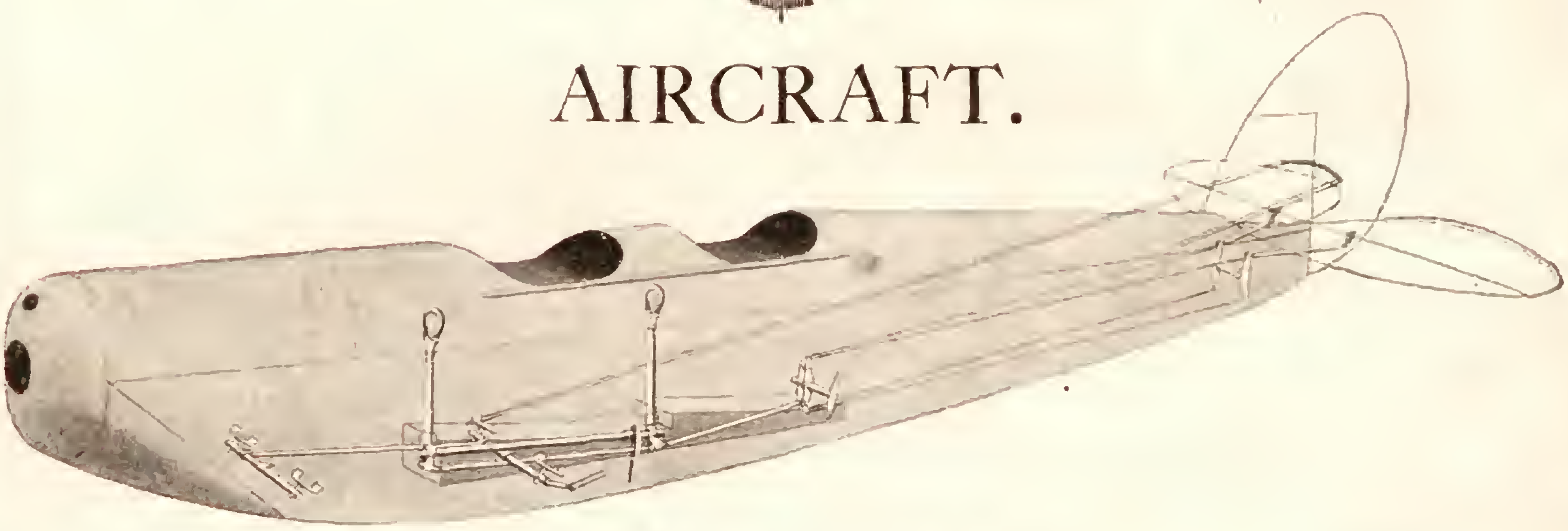
The landing gear is well designed, and is of the "Oxford-



THE WRIGHT-BELLANCA SIX-SEATER: Side view showing the wing bracing struts, which also form lifting surface, and the "Oxford Bags" landing chassis.

This announcement is the first of a series dealing with

DESIGN AND CONSTRUCTIONAL FEATURES OF D.H. AIRCRAFT.



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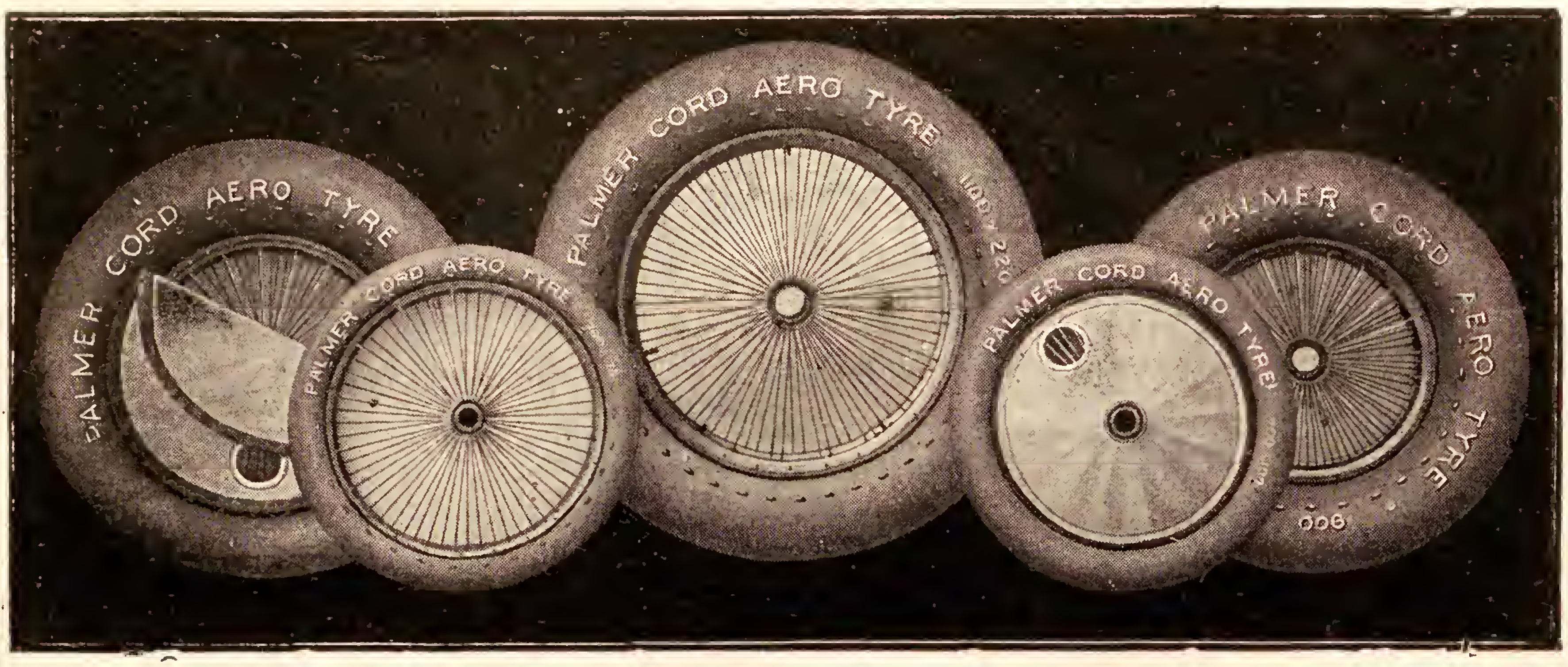

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450 × 60	30	89.	31.75	Central
”	138	130.	38.09	Central
575 × 60	21	160.	28.	Central
”	34	150.	31.75	104/46
”	111	150.	38.09	104/46
600 × 75	21	160.	28.	Central
”	34	150.	31.75	104/46
”	111	150.	38.09	104/46
700 × 75	78	178.	44.45	132/46
”	79	178.	44.45	Central
”	100	178.	38.09	132/46
”	101	178.	31.75	132/46
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”	92	185.	55.	135/50
”	95	185.	55.	Central
”	96	178.	55.	132/46
700 × 100	99	178.	38.89	132/46
”	112	150.	38.09	Central
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”	147	178.	55.	Central
750 × 125	77	178.	44.45	132/46
”	92	185.	55.	135/50
”	95	185.	55.	Central
”	96	178.	55.	132/46
”	99	178.	38.89	132/46
”	112	150.	38.09	Central
800 × 150	82	185.	55.	135/50
”	85	185.	55.	Central
”	161*	185.	55.	135/50
”	163*	185.	66.67	135/50
”	169†	185.	55.	135/50
”	211*	185.	60.32	135/50
1000 × 150	131	220.	66.67	Central
”	150	185.	55.	Central
”	167	185.	55.	125/60
”	174	250.	80.	Central
1000 × 150	201	185.	60.32	125/60
”	210	185.	60.32	Central
1000 × 180	148	220.	80.	Central
”	149	185.	55.	Central
”	155	220.	66.67	Central
”	166	185.	55.	125/60
900 × 200	107	185.	55.	Central
”	108	185.	55.	125/60
”	128	220.	66.67	Central
”	137	250.	80.	Central
”	202	185.	60.32	Central
1100 × 220	134	220.	66.67	Central
”	136	250.	80.	Central
1250 × 250	133	250,	80.	Central
”	154	304.8	101.6	Central
1500 × 300	115	304.8	101.6	Central
”	126	304.8	152.4	Central
1750 × 300	139	400.	152.4	Central

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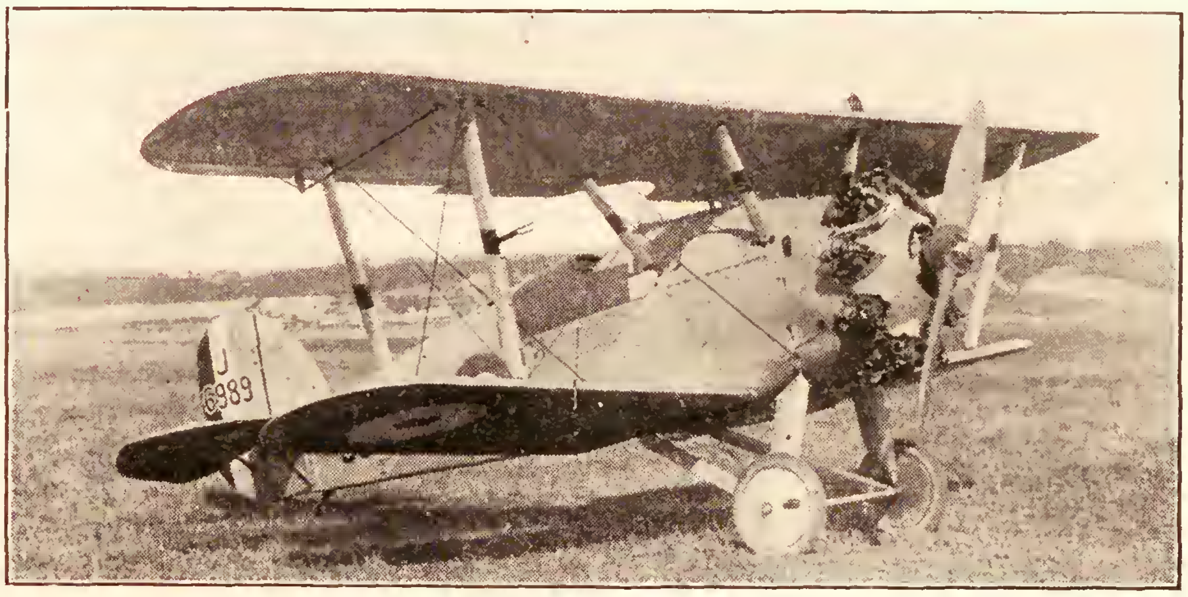

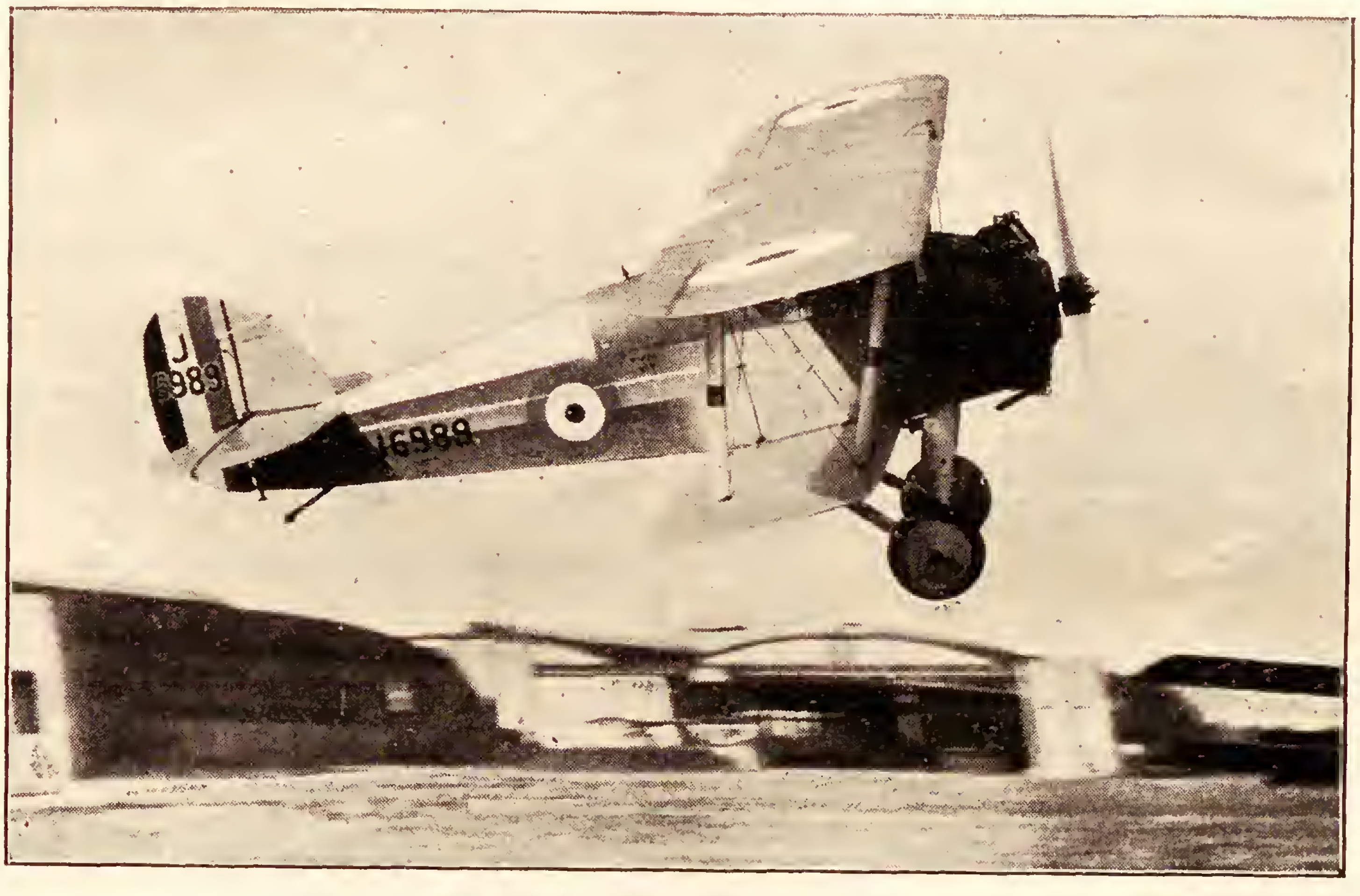

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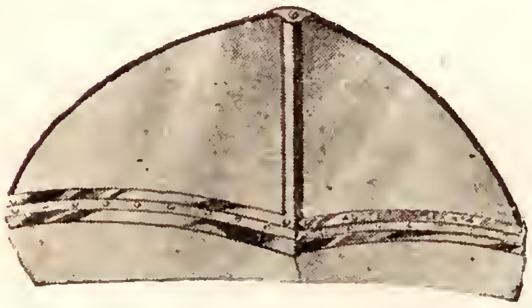

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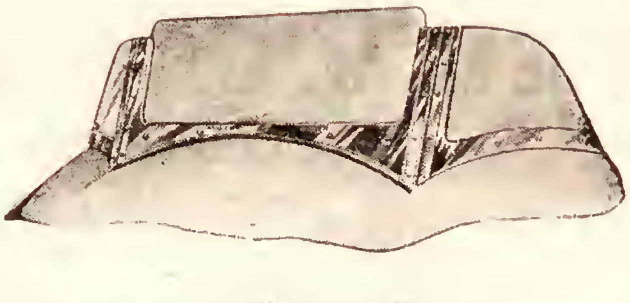

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Bags" variety (viewed from the front there is a decided bandiness); as well as having a comparatively wide track, this landing gear is also very strong.

The Wright "Whirlwind" engine is installed in a steel engine mount hinged to the nose of the fuselage so that it can readily be swung to one side, allowing for inspection or adjustments at the rear of the engine. This engine mount is made from welded steel and tube chrome molybdenum steel, and weighs only 13½ lb. The oil tank is located in this mount.

From a profit-making standpoint, the Wright-Bellanca would appear to offer great possibilities, seating five passengers with light luggage, or six passengers without luggage. For express and mail carrying the large cabin space (122 cub. ft.) provides a great amount of cargo room.

Having a quick take-off (900 ft. per min.) and short "roll," the Wright-Bellanca could be used in any locality when ordinary landing field facilities are found. Once in the air and under normal cruising conditions only a low output of power is necessary, which means a low fuel cost.

With the high speed figure of 138 m.p.h., attained at the New York air races, this machine cruises easily at 100 m.p.h. at 1,500 r.p.m. At this rate the fuel consumption is about 12·5 gallons per hour. It was also noticed at the New York air meet demonstrations that the Bellanca could fly at low speeds with the tail well down without any danger of pancaking or stalling. This makes for a short "roll" in landing, which, together with the low landing speed of 42 m.p.h., is all in its favour as regards commercial work.

Other more important characteristics of the Wright-Bellanca are as follows:—

Span	45 ft. 0 in.
Chord	6 ft. 7 in.
O.A. length	24 ft. 9 in.
Height	8 ft. 5 in.
Wing area	272 sq. ft.
Weight, empty	1,790 lb.
Weight, fully laden	3,230 lb.
Weight per h.p., fully laden	16·1 lb.
Weight per sq. ft., fully laden	11·8 lb.
Pay load	850 lb.
Fuel capacity	63 gals.
Oil capacity	5½ gals.

◆ ◆ ◆ ◆

WITH SEAPLANE AND SLEDGE IN THE ARCTIC*

THE author of this remarkable and brilliant publication, brilliant not only for the narrative of all absorbing interest, but also for the fine literary story-telling style in which it is written, is only 24 years of age, and has been responsible for organising three Oxford Expeditions in the last four years, and has also been leader of the last two detailed in this book.

Mr. Binney's volume will be found to be of invaluable interest to those interested in Polar exploration, or anyone engaged in studying any of the numerous subjects which come under this title. Explorers in general will find the Appendices of great assistance in planning or organising a party for exploration of any kind, whether it be raiding the great African jungles or endeavouring to conquer Mount Everest, his notes on the "Handling of an Expedition's Press and Film Rights," "A Form of Agreement for Enrolling Members of an Expedition," or "Salient Points of a Ship's Charter in the Arctic, Insurance, etc.," will be found to be both instructive and informative, and not of little value to those desirous of following the footsteps of the Vikings, as well as scientists.

This thrilling story of adventure reveals how, with the aid of a seaplane, two ships, and three sledging parties, the work of exploring North-East land was carried out in the face of misfortunes and adversity. Interwoven into the story there is a mass of information on all manner of subjects connected with Arctic exploration. It is stated that it has been Mr. Binney's particular aim to initiate those who are desirous of undertaking Polar exploration, and who are handicapped by lack of experience, into the ways and means of fulfilling their wishes. We do not know of any book of recent years dealing with this subject in such a practical manner so thoroughly and exhaustively.

The courage, resource, and dauntless resolution which distinguished every member of the expedition, is justly paid tribute to by Professor W. J. Sollas, D.Sc., LL.D., F.R.S., in a comprehensive preface. "The purpose of the expedition was threefold," writes Prof. Sollas, "first, and most general, to test the powers of a new method of attack by observation from the air. This was successfully accomplished. The possibility of using a seaplane in arctic waters as an instrument of research was established, and, by its means, used in conjunction with observations on the land, a topographical survey of parts of North-East Land—the most northern survey of this kind ever attempted—was achieved."

The Council of the Air Ministry was not slow to recognise the value of this work, and they have formally expressed the opinion that the report of the aircraft work of the expedition is "a material contribution to the solution of the difficulties attending aerial surveys in arctic regions."

The second purpose of the expedition was directly scientific, dealing with the structure of the land, the movements of the ice, and phenomena of the atmosphere, etc. The British Isles, scientists aver, were, twenty or thirty thousand years ago, subject to all the rigours of an arctic climate, and those engaged in the study of problems of this kind will find much profitable information in the report of the Oxford expedition.

Thirdly, the purpose of the expedition was to serve as a school for explorers—though it proved to be a hard school for the members of the expedition. Nevertheless, it places at the disposal of all direct knowledge of facts which will prove of inestimable service to those engaged in the field of science. Prof. Sollas sums up the crowning success of the expedition with a notable sentence: "Peace has its victories no less than war, and this was one of them."

To Major-General Sir Sefton Brancker the expedition tenders its thanks for his support, but we cannot do better than quote the reference to the conservative attitude of the Air Ministry itself, the last sentence illustrating the true sportsmanship of the Leader.

"The Air Ministry itself gave little support—and that charily, in spite of the recommendation of two ex-Air Ministers. They were not prepared to lend either a pilot or instruments for experimental work. Finally, they were induced to loan certain instruments and to construct an aerial camera, but at so late a stage that the camera could undergo no tests prior to our departure. In return for this loan we were to carry out certain experiments and to furnish a report; but, lest the seaplane should crash in the course of these experiments and the instruments be lost, we were required to furnish a bond of £300, which is another way of saying 'Heads we win, tails you lose.' 'But, when all is said and done,' remarks Mr. Binney, 'why should they adopt any other attitude?' "

Messrs. A. V. Roe and Co., Ltd., built the seaplane and supplied all its equipment and spare parts at less than cost price (£1,200). Messrs. Armstrong-Siddeley loaned the expedition one of their new 180-h.p. Lynx air-cooled engines for the seaplane. The Radio Communication Company undertook to instal the ship—the *Polar Bjorn*—with standard ship's wireless, and to lend an operator; whilst the British Petroleum Company presented the party with petrol supplies, and loaned them the services of Capt. J. C. Taylor as ground engineer for the seaplane. Sir Charles Wakefield presented the lubricating oil for ships and seaplane, while Sir John Thornycroft lent a powerful Thornycroft motor-launch for use in the ice.

It was a matter of difficulty to secure an experienced staff of airmen, but if difficult to obtain, they amply repaid, as the story of their herculean work throughout confirms. The aerial staff included Messrs. Tymms (navigator, photographer, and scientist), Taylor (ground engineer), and Ellis (pilot), the latter, the author tells us, having had over one thousand hours' flying experience on all types of seaplanes. The seaplane was a modification of the standard Avro 504K, and the fuselage had been constructed with a view to the nature of the undertaking. In place of the observer's seat a small cabin had been built, which had a sliding roof and windows on either side. The seaplane, in case of a forced landing, carried rations for two men for a month, and sledging equipment and a tent. A seven-foot sledge was built into the afterpart of the fuselage. One of the first seaplane flights resulted in a crash halfway between Liefde Bay and Green Harbour, and for an enthralling pen picture of the plight of the occupants—one of them was the author of the volume under review—we cannot do better than recommend to our readers the chapter entitled, "Not According to Plan,"

* "With Seaplane and Sledge in the Arctic." The account of the 1924 Oxford Arctic Expedition, by George Binney. Hutchinson and Co., 21*s*. net.

which tells of their efforts to paddle the wrecked seaplane to shore. The *Farm* (or *Fram*) eventually came to their assistance, but it was only after 14 hours of anxiety, and when all endurance was giving out, that a small Norwegian motor-boat came to their rescue and towed the explorers to land.

The book is replete with thrills of great adventure in the frozen North, coupled as we have remarked with information of inestimable value to those engaged in scientific research.

The leader of the expedition is to be congratulated that all returned home safe and sound—even the dogs—despite their perilous adventures. They saw and conquered, and what is more pleasing than the happy return of such a party, bringing with them such invaluable information? This volume contains 50 excellent illustrations.

CORRESPONDENCE

The Editor does not hold himself responsible for opinions expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters intended for insertion in these columns.

THE LIGHT PLANE CLUBS

[2109] In a recent issue of FLIGHT, I notice that in the account of the London Aeroplane Club Dinner Captain Sparks asked if the Secretary of that Club would draw the attention of the Aero Club and the Air Ministry to the fact that the London Aeroplane Club should have preferential treatment. Beyond stating that London is the capital of England, and that the population is greater than any other Light Aeroplane Club centre, I fail to see how Captain Sparks can justify his remarks. Such an attitude is not likely to create harmony with the other Clubs who have had, in most cases, exceptional difficulties to overcome before progress could be made. My own idea is that preference—if such a stupid state of affairs should be brought into existence—should be on the basis of results, and in that respect I think my own Club (Newcastle) could claim a good hearing. This, however, we do not desire, as our own object is to get on with our allotted task.

JOHN BELL

Newcastle-upon-Tyne,
December 28, 1925.

AIRSHIPS IN WAR

[2110] Are large rigid airships of any value in wartime?

My reply is: "No."

I have advanced this view in my recently published "Strategy and Tactics of Air Fighting" (Longmans), and Maj. F. A. de V. Robertson, in his criticism in your issue of December 10, takes exception to it.

"The sphere of the airship," he says, "is to be patrolling the ocean trade routes and their quarries will be raiders like the *Emden*, it being axiomatic that the British Navy will forbid the surface of the sea to hostile carriers so that the airships will never be subject to attack from aeroplanes unless the latter have been released from another airship."

This reasoning, which I know to be that most often advanced by the advocates of military airships, is incontrovertible. It proves conclusively the opposite to what it is intended to prove. It is, in fact, a form of pistol which, when fired, blows off the marksman's own head.

Allow me to pull the trigger. If the British Navy can forbid the surface of the sea to hostile carriers, which implies hostile warships (including submarines) it must be able to forbid it to raiders and to ensure the safety of the trade routes. If the safety of the trade routes is ensured, the only function which the airship could fulfil would be the reconnaissance of stretches of sea water.

The argument to which your critic referred may be summed up thus: The British Navy can prevent hostile ships from approaching the scenes of operations; therefore, the British Navy requires airships to prevent hostile ships from approaching the scenes of operations. Read that through quickly three times and its force may become clear.

A variation may be played upon the same theme thus: The airship can fight provided the other man cannot hit back. That is, of course, the only satisfactory way of fighting; but the other man, like the happiness complained of by the would-be philosopher, *will keep butting in.*

If the destruction of hostile aerodromes—floating and other—within range of the scene of operations could be ensured by our land and sea forces, we could go to war in the R.33. But wait! If we can ensure the destruction of those hostile aerodromes we must have won the war already, so the R.33 can remain in its tin.

OLIVER STEWART

London.
January 2, 1926

"A" LICENCES

[2111] Will you allow me to point out that in your leader on "Control Without Occupation" in your issue of December 24 you are in error in stating that the private owner's machine "must be certified for *each* flight by a ground engineer, whom the pilot has to pay"? This regulation only applies to commercial aircraft "carrying passengers for hire." The airworthiness certificate for a private aircraft holds good for 12 months without any further certificate, except in the case of an accident necessitating repairs, which must be certified by a ground engineer as efficiently effected.

All that the private owner requires is an "A" licence for himself, and an airworthiness certificate for "subsequent aircraft" (*i.e.*, not a "type airworthiness certificate") for his machine, valid for 12 months. I do not agree with Mr. Handley Page that these simple requirements constitute a "stranglehold" on private flying. The private owner is not even required to use a licensed aerodrome, but can at his own risk, use any field. All he is required to carry in his machine are his own pilot's "A" licence, certificates of registration and airworthiness of the machine, and—not "log books"—but one "journey log book." In this he need only enter details of times and places of departure and arrival of each flight, of any forced landings and of any damage sustained.

Personally I have always considered these regulations eminently reasonable, and the minimum necessary for safety. The criticisms voiced at the Royal Aero Club dinner you reported were in almost every case made by persons who obviously were not acquainted with the regulations, but confused those affecting commercial and private aircraft respectively.

W. LOCKWOOD MARSH, *Lieut.-Col.*

ADVISORY COMMITTEE REPORT ON ATMOSPHERIC POLLUTION

THE Eleventh Annual Report of the Committee for the Investigation of Atmospheric Pollution, has just been issued. The contents are divided into four sections:—Section 1 deals with the deposit of impurity at 48 different stations. Tables are given showing the stations with the highest and lowest deposits for the year ending March 31, 1925, compared with a general average for the same stations for the previous five years. The rainfall was higher than the average in most stations, while the deposit of tar was lower. There was little difference in the deposit of sooty matter, but the total impurity was somewhat less than the average in most stations.

Section 2 deals with the automatic recorder for suspended impurity and some very interesting results are given for Blackburn and Stoke-on-Trent. The effect of wind in governing the concentration of impurity is also dealt with at some length.

Section 3 describes dust counter observations made in different countries. There are also observations on settlement during smoke fogs, and a new explanation is given of the causation of the "London Particular."

In Section 4 the special researches undertaken by the Committee are described.

Copies of the publication are obtainable from all branches of H.M. Stationery Office, or through any bookseller, price 5*s.* 6*d.*, postage 1½*d.* extra.

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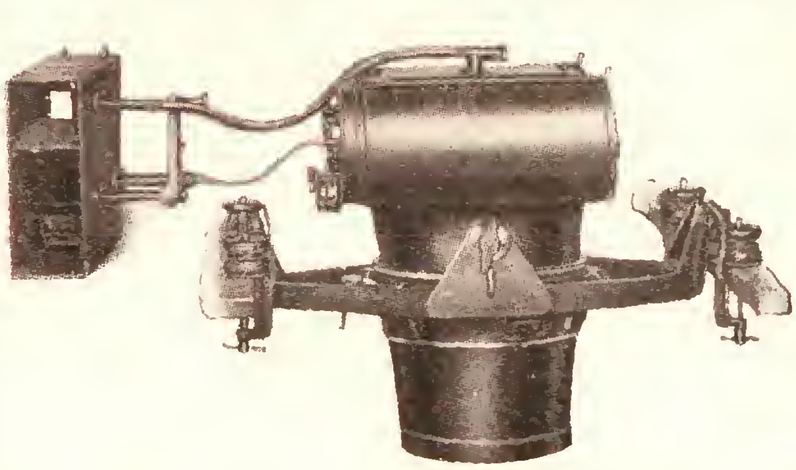

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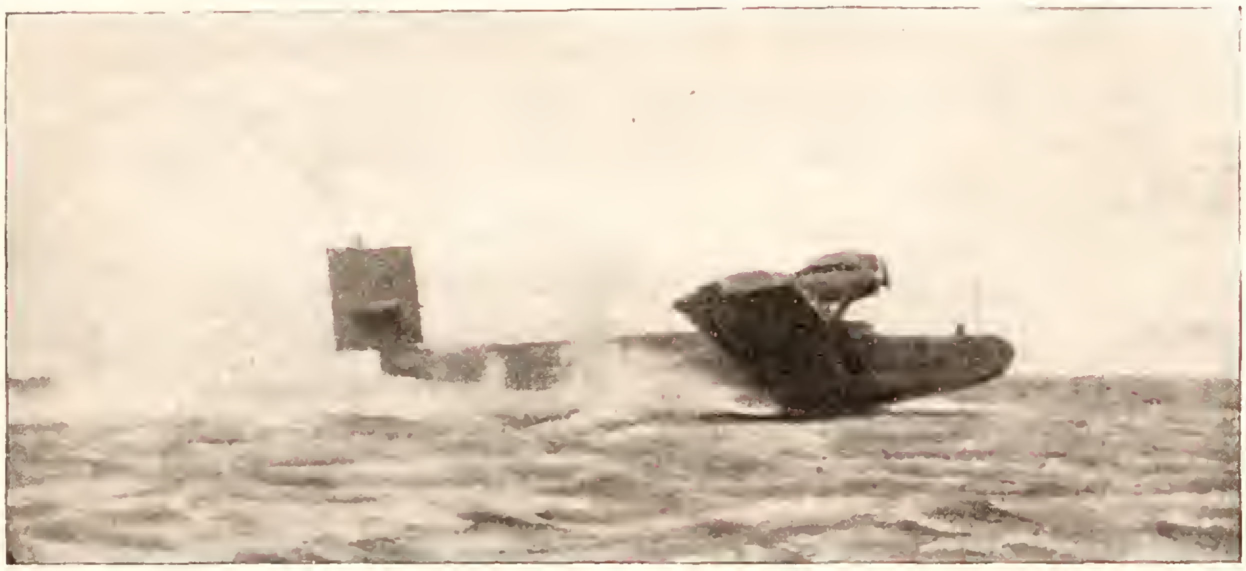

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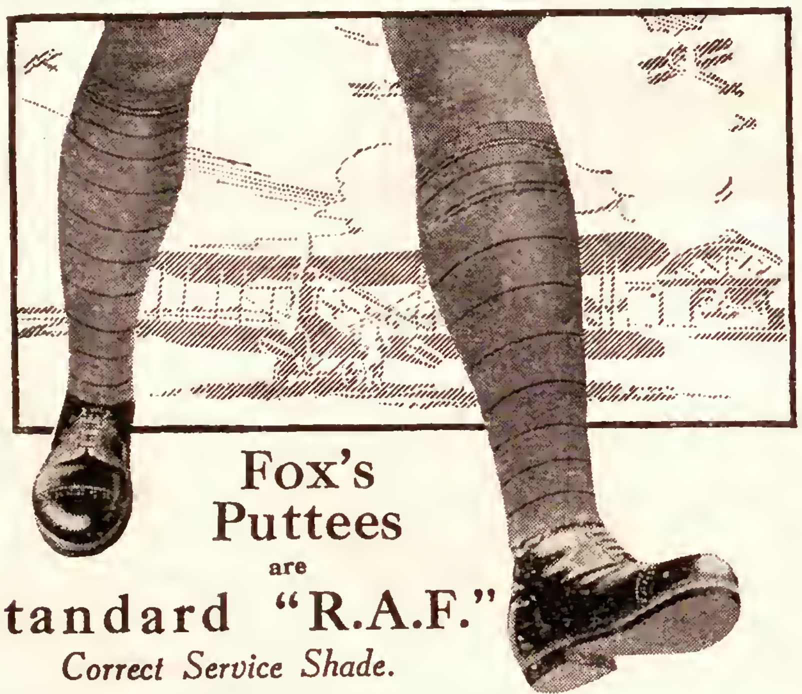

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THE ROYAL AIR FORCE

London Gazette, January 1, 1926

General Duties Branch

The following are granted permanent commissions in the ranks stated (January 1) :—*Flight Lieutenants.*—G. C. Bladon, D. H. Carey, F. Carpenter, C. Hallawell, C. G. Halliday, F. H. D. Henwood, D.F.C., E. J. Kingston-McCloughry, D.S.O., D.F.C., V. S. Parker, N. M. S. Russell, S. P. Simpson.

Flying Officers.—J. N. Boothman, B. E. Embry, A.F.C., C. H. Flinn, A. D. H. Foster, C. B. Greet, P. J. R. King, A. H. Love, J. S. Phillips, A. E. Rogenhagen, H. S. Sandiford, A. T. K. Shipwright, D.F.C., G. H. Smith, E. S. C. Vaughan, M.C., R. C. Wansbrough, M. V. Ward.

Flying Officer R. A. P. Roberts is placed on half-pay Scale B (Dec. 23, 1925). The following Flying Officers are transferred to the Reserve, Class A (Dec. 29, 1925) :—E. Marler, H. J. Wykes.

Stores Branch

Flying Officer C. W. H. Moller is confirmed in his appointment in the Stores Branch (Nov. 25, 1925.)

Accountant Branch

Pilot Officer on probation J. R. Thomas is confirmed in rank and is promoted to the rank of Flying Officer, with effect from Dec. 3, 1925, and with seny. Nov. 10, 1925.

Reserve of Air Force Officers

H. Wyllie, O.B.E., is granted a commn. in Class C., General Duties Branch, as a Flying Officer (Dec. 29, 1925) ; Pilot Officer L. F. Cubitt is confirmed in rank (Dec. 23, 1925) ; Flight-Lieut. S. H. Gaskell is transferred from Class A to Class C (May 30, 1925) ; The commn. of Pilot Officer on probation. W. B. O'R. Coleman is terminated on cessation of duty (Dec. 8, 1925.)

Memorandum

G. S. Marshall, O.B.E., is granted a temp. commn. as a Flight-Lieut. (Legal Officer). (Dec. 14, 1925.)

London Gazette, December 20, 1925

Group Capt. P. F. M. Fellowes, D.S.O., is appointed Air Aide-de-Camp to His Majesty the King (Dec. 17) (vice the late Group Capt. C. F. Kilner, D.S.O.)

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified :—

General Duties Branch

Wing Commander W. C. Hicks, A.F.C., to No. 2 Wing H.Q., India, to Command ; 3.11.25.

Wing Commanders : J. C. Halahan, C.B.E., A.F.C., to R.A.F. Depot, pending disposal on transfer to Home Estab. ; 30.10.25. I. G. V. Fowler, A.F.C., to R.A.F. Depot, pending disposal on transfer to Home Estab. ; 4.11.25.

Squadron-Leader R. H. M. S. Saundby, M.C., A.F.C., to No. 4 Flying Training School, Egypt ; 9.12.25.

Flight-Lieutenants : J. R. Cassidy, to H.O., Palestine ; 11.12.25. R. Whitaker, M.B.E., to H.Q., Inland Area ; 10.1.26. L. H. Browning, M.C., D.F.C., to No. 3 Sqdn., Upavon ; 4.1.26. E. L. Ardley, to R.A.F. Depot, on transfer to Home Estab. ; 30.10.25. W. Catchpole, A.F.C., to R.A.F. Depot, on transfer to Home Estab. ; 4.11.25.

Flying Officers : T. H. Moon, to Engine Repair Depot, Egypt ; 28.11 25. E. B. Addison, to R.A.F. Depot ; 1.1.26. B. E. Embry, to No. 30 Sqdn., Iraq ; 1.12.25. F. W. Long, to Experimental Section R.A.E., S. Farnborough ; 16.1.26. (Hon. Flight-Lieuts.) E. V. Major and F. E. Watts, to R.A.F. Base, Calshot ; 19.1.26. T. B. Fenwick, to Central Flying School, Upavon ; 4.1.26. (Hon. Flight-Lieut.) I. E. Brodie, to R.A.F. Training Base, Leuchars ; 4.1.26. J. R. Brown, D.F.C., to No. 70 Sqdn., Iraq, instead of to H.Q., Iraq, as previously notified ; 18.11.25. F. W. L. C. Beaumont, to No. 45 Sqdn., Iraq ; 12.12.25. F. L. Kingham, to No. 1 Stores Depot, Kidbrooke ; 3.1.26. G. V. Wheatley and C. Gardner, to R.A.F. Depot, on transfer to Home Estab. ; 30.10.25. J. T. Hall, to No. 24 Sqdn., Kenley ; 8 1.26. C. C. Musselwhite, to R.A.F. Depot, on transfer to Home Estab. ; 4.11.25. K. R. Thomas, to R.A.F. Depot, on transfer to Home Estab. ; 30.10.25. F. G. S. Mitchell, (Hon. Flight-Lieut.) G. N. Carroll and J. B. Townend, to R.A.F. Depot (Non-effective Pool), on transfer to Home Estab. ; 30.10.25.

Pilot Officers : J. F. Young, to R.A.F. Base, Calshot ; 19.1.26. B. B. Dowling, to No. 2 Flying Training Sch., Digby ; 16.1.26 C. W. Martin, to No. 23 Sqdn., Henlow ; 1.1.26. D. C. Shaw, to No. 43 Sqdn., Henlow, instead of to R.A.F. Base, Calshot, as previously notified ; 15.12.25. B. E. Moody, to No. 2 Flying Training Sch., Digby ; 16.1.26. J. G. Chamberlain, to No. 23 Sqdn., Henlow, instead of R.A.F. Base, Calshot, as previously notified ; 15.12.25.

Stores Branch

Flying Officers : F. A. Ormerod, to No. 1 Stores Depot, Kidbrooke ; 22.12.25. S. D. Dennis, to H.M.S. *Furious* ; 1.1.26. W. Bourne, to Air Ministry ; 11.1.26.

Accountant Branch

Flight-Lieutenant C. H. Moore, to Aircraft Depot, Egypt ; 5.11.24.

Medical Branch

Wing Commanders : A. W. Iredell, to H.Q., Halton, for duty as Principal Med. Officer ; 7.1.26. B. A. Playne, D.S.O., M.B., B.A., to Air Ministry for Medical Staff duties ; 7.1.26.

Squadron-Leader H. A. Hewat, M.B., D.T.M. & H., to H.Q., Egypt ; 7.12.25.

Flight-Lieutenant (*Dental*) H. J. Higgins, to H.Q., Palestine ; 17.12.25.

Flying Officers : W. A. Beck, M.B., D.P.H., to Palestine General Hospital ; 30.11.25. H. M. Levy, to No. 5 Flying Training School, Sealand ; 29.12.25.

NEW YEAR HONOURS

It is announced in a Supplement to the *London Gazette* that H.M. the King has signified his intention of conferring the following New Year Honours :—

Order of the Bath

K.C.B. (*Military Division*)

Air Vice-Marshal Sir William Geoffrey Hanson Salmond, K.C.M.G., C.B., D.S.O., p.s.c., Royal Air Force.

Sir Geoffrey Salmond was born in 1878, passed through the Royal Military Academy at Woolwich, and joined the Royal Artillery in 1898. He served with distinction in the South African War and in China in 1900. In the Great War he first commanded No. 1 Squadron of the Royal Flying Corps, and subsequently the 5th Wing. He served with the Royal Air Force in the Middle East from 1916 to 1921. During this period he was created K.C.M.G. and C.B. ; the D.S.O. was conferred upon him, he was mentioned in despatches and granted foreign Orders. Since 1922 he has been Director-General of Supply and Research at the Air Ministry.

Promotions and Awards

The King has approved the promotion of Wing Commander Richard Charles Montagu Pink, C.B.E., to the rank of Group Captain in the Royal Air Force in recognition of his distinguished services in the field in Waziristan. To date Jan. 1, 1926.

The King has approved of the following awards to the undermentioned officers and airmen of the Royal Air Force :—

Air Force Cross.—Squadron Leader Arthur Coningham, D.S.O., M.C., D.F.C. ; Flight Lieut. Leonard Graeme Maxton ; Flying Officer Basil Edward Embry.

Air Force Medal.—327067 Leading Aircraftsman (Acting Corporal) Frank Stone ; 11838 Corporal (Acting Sergeant) Henry Grant ; 87366 Sergeant (Pilot) Thomas William James Nash.

The undermentioned are promoted, with effect from Jan. 1, 1926 :—

General Duties Branch

Wing Commander to be Group Captain.—Edmund Digby Maxwell Robertson, D.F.C.

Squadron Leaders to be Wing Commanders.—Frederick Henry Unwin, O.B.E. ; Vivian Gaskell-Blackburn, D.S.C., A.F.C. ; Henry John Francis Hunter, M.C. ; Arthur Clinton Maund, C.B.E., D.S.O. ; Douglas Harries, A.F.C. ; Arthur Claud Wright, A.F.C. ; John Oliver Archer, C.B.E. ; Charles William Nutting, O.B.E., D.S.C. ; Robert Leckie, D.S.O., D.S.C., D.F.C. ; Walter Gerald Paul Young, O.B.E.

Flight Lieutenants to be Squadron Leaders.—Henry Cockerell, O.B.E. ; Francis William Trott, O.B.E., M.C. ; Alan Fitzroy Somerset-Leeke ; Frederick George Sherriff, M.C. ; John Farquhar Gordon, D.F.C. ; Charles Beauvoir Dalison, A.F.C. ; Richard Spencer Lucy, A.F.C. ; William Samuel Caster, M.C. ; Wilfred Henry Dunn, D.S.C. ; Charles Langston Scott, D.S.C. ; Hugh Henry MacLeod Fraser ; Dirk Cloete, M.C., A.F.C. ; Albert Durston, A.F.C. ; Meredith Thomas, D.F.C., A.F.C. ; Trevor Edward Salt, A.F.C.

Flying Officers to be Flight Lieutenants.—John Christian Barraclough ; George Henry Russell, D.F.C. ; Horace Gramshaw Payne Ovenden ; Thomas Humble ; Hilton Oscar Brown, M.M. ; George Robert Oliver ; Gilbert Latham Ormerod ; Richard Vaughan Bramwell-Davis (Lieut., R.F.A.) ; Denis Holcombe Carey ; John Duncan ; Christopher Neil Hope Bilney ; William Whitefield McConnachie ; Charles Dudley Palmer ; Alfred Edwin Lindon, M.B.E. ; Albert James Ernest Broomfield, D.F.C. ; Thomas Rose, D.F.C. ; Charles Leslie Cox ; Pat Murgatroyd ; Ernest Caizley Usher ; Vincent Percy Feather ; Eyare King Blenkinsop ; Charlton Hallawell ; Robert John Hayne Holland ; Robert Lyle McKindrick Barbour, D F.C. ; Lawrence Fleming Pendred, D.F.C. ; Charles John Sims, D.F.C. ; John Lawrence Kirby ; Frederick Frank Garraway ; Owen Wilson Clapp ; Campbell Alexander Hoy, M.C. ; Sidney Herbert Ware ; Frank George Gibbons, D.F.C. ; Cecil Arthur Bouchier, D.F.C. ; Harold John Saker ; Reginald Morville Davy ; Frank George Brockman ; Ernest Henry Attwood ; William James Millen ; Edmund Henry Searle ; Eric Brewerton, D.F.C.

Stores Branch

Flight Lieutenants to be Squadron Leaders.—Nevill Ross Fuller ; Walter Langston Shaw, M.B.E.

Flying Officers to be Flight Lieutenants.—George Thomas Stroud, M.B.E. ; Ernest William Lawrence ; John Clifford Shakeshaft ; Frank Edwin Shersby ; Robert Craig ; Reginald Vivian Robinson, O.B.E. (Supplementary List).

Accountant Branch

Squadron Leader to be Wing Commander.—Herbert George Jones.

Flying Officers to be Flight Lieutenants.—James Frederick Robert Eales-White ; Herbert Charles Frederick Ellis.

Medical Branch

Squadron Leader to be Wing Commander.—Frank Cuninghame Cowtan.

Flight Lieutenants to be Honorary Squadron Leaders.—George Stephen Ware, M.B. ; Edmond Francis Neville Currey ; Charles Anderson Meaden ; Frederick Ernest Wilson.

Princess Mary's R.A.F. Nursing Service

Sister to be Acting Senior Sister.—Miss Janet MacLeod, A.R.R.C.

Acting Sisters to be Sisters.—Mrs. Louisa Learmouth Mackenzie ; Miss Mary Anne MacVicar ; Miss Elizabeth Spensley, A.R.R.C. ; Miss Ellen Kate Griffin.

Staff Nurses to be Sisters.—Miss Elizabeth Ann Risdon ; Miss Gertrude Swanston ; Miss Jessie Warnock Walker.

Staff Nurses to be Acting Sisters.—Miss Alice Mary Hardwicke ; Miss Pauline Kipping Pearce ; Miss Ellen Jane Stuart ; Miss Mary McCallum.

THE ROYAL AIR FORCE MEMORIAL FUND.

THE usual meeting of the Grants Sub-Committee of the above Fund was held at Iddesleigh House, on December 21.

Lieut.-Commander H. E. Perrin was in the chair, and the other members of the Committee present were :—

Mrs. L. M. K. Pratt-Barlow, O.B.E., and Squadron Leader E. B. Beauman.

The Committee considered in all 18 cases, and made grants to the amount of £78 10s.

The next meeting was fixed for today, January 7.

⁂

Air A.D.C. to The King

THE Air Ministry announces the appointment of Group Captain Peregrine Forbes Morant Fellowes, D.S.O., as Air Aide-de-Camp to the King (vice the late Group Captain Cecil Francis Kilner, D.S.O.) .

London-Cape Town Survey Flight

WRITING from Khartoum, Alan J. Cobham, who is making steady progress in the London-Cape Town survey flight in a D.H.50J (Siddeley "Jaguar"), sends us the following notes: "The practical side of aviation from Cairo to Khartoum is ideal and even in summer time a service could be maintained, for one can fly any time 365 days of the year day and night. . . . The Wadi Halfa-Aswan air link by seaplane, following the Nile all the way, could easily be done in two hours, and the fastest boat downstream takes 24 hours, and 36 hours upstream. . . . Landed Luxor to make film—also landed at Aswan and took fine film of Dam from air and ground also. . . . The idea is to make a propaganda film for British aviation, so must have topical stuff. . . . Up to present we have not found it necessary to fly early morning only, due to heat. True, we are in winter weather now, but the D.H.50 and 'Jaguar' combination works well for performance. . . . Both are standing up well. Machine up to present simply jumps off the ground with full load. . . . Staying at Khartoum over Xmas and then going on into the Sud to Malakal and Mongalla. Up to present have found ample supplies of B.P. spirit, which is doing very well now we have the 80-20 mixture. Also found ample supplies of Castrol everywhere, and oil temperature is keeping well down.—Alan J. Cobham." The 400-mile leg across the Sud swamp from Malakal to Mongalla was safely accomplished on January 2. During the stop at Malakal a special War Dance was given by the Shilluk warriors in honour of the airmen.

An Amateur Airship Club

COMMANDER F. L. BOOTHBY is once again endeavouring to form an amateur airship club, on the lines of the light aeroplane clubs. As we have remarked on previous occasions regarding this idea, such a club would offer great possibilities, not only from the sporting point of view, but as a national question. Small, safe and easily controlled airships of the "Blimp" type are no longer in the experimental stage, and have already proved themselves to be efficient and practicable. Such a club would serve, in a way, to fill the gap in British airship activity, pending the completion of the two Imperial airships (probably, 1928), resulting in the decision not to proceed with the reconditioning of R.36—R.33 having now nearly concluded its mission in life (No. 2).

R.A.F. Flying Accident

THE Air Ministry regrets to announce that as the result of the flying accident which occurred near Nefisha, Egypt, on December 23 last, No. 328867 A.C.1 Arthur Thomas Groom, the passenger of the aircraft, died of injuries on December 24, 1925.

A "Lion" at the School Boys' Exhibition

A NAPIER "Lion" aero engine is being exhibited at the School Boys' Exhibition at the Horticultural Hall. This engine, situated beneath the motherly wings of the Baby "Moth" aeroplane, is shown in action and various parts have been cut away so that the different movements of the engine can be seen working. This same engine was exhibited by the Air Ministry at Wembley, and it is interesting to record that during the six months of the British Empire Exhibition the engine ran from 9 a.m. until 10 p.m. continually every day without any attention. Looks as if that 100-hour Air Ministry type test will have to be modified !

Institution of Aeronautical Engineers

WE would remind our readers that Mr. C. Howarth is reading a paper on "Some Aspects of Full-Scale Experiments" before the Institute of Aeronautical Engineers on January 12.

SIDE-WINDS

IT will be a matter of general interest to know that Mr. Brook Flowers, late of Messrs. Imperial Airways, Ltd., and formerly of Messrs. Handley Page, Ltd., who for many years has been engaged in commercial aviation, has now joined the Lep Transport and Depository, Ltd., which firm, as is generally known, are taking a very active interest in the development of commercial aviation.

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WE undersand that the Beardmore W.B.XXVI biplane (Rolls-Royce "Eagle IX") supplied to Latvia, and illustrated in last week's issue of FLIGHT, was doped with Titanine T.2.S.

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PUBLICATIONS RECEIVED.

War Office : Graphical Methods of Plotting from Air Photographs, 1925. By Lt.-Col. L. N. F. I. King, O.B.E. H.M. Stationery Office, Kingsway, London, W.C.2. Price 3s. net.

Illustrated Calendar, 1926. Wm. Beardmore & Co., Ltd. Glasgow.

Deruluft—1 Million Lufthilometer. Deutsch-Russische Luftverkehrs-Gesellschaft, Sommerstrasse 4, Berlin, N.W 7.

Report on the Health of the Royal Air Force for the Year 1924. *Air Publication* 1184. H.M. Stationery Office, Kingsway, London, W.C.2. Price 4s. net.

Journal of the American Society of Naval Engineers. November, 1925. American Society of Naval Engineers, Navy Department, Washington, D.C., U.S.A.

Canadian Patent Office Record. November 24, 1925. *Vol. LIII, No.* 47. Patent and Copyright Office, Ottawa, Canada. Price 25 cents.

Illustrated Calendar, 1926. "*Fairey Aircraft.*" The Fairey Aviation Co., Ltd., Hayes, Middlesex.

Morris Electric Runway. Herbert Morris, Ltd., Loughborough.

Rules of the Royal Aeronautical Society, December 30, 1925. The Royal Aeronautical Society, 7, Albemarle Street, London, W. 1.

The Olympian : Christmas Number, 1925. The Blackburn Aeroplane and Motor Co., Ltd., Olympia, Leeds.

Illustrated Calendar, 1926. The Blackburn Aeroplane and Motor Co., Ltd., Olympia, Leeds.

Aeronautical Information : General Questions and Statistics. By Prof. N. A. Rynin, Moscow, 1925. (In Russian.) Price, 2 roubles 25 kop.

Illustrated Calendar, 1926. The Bristol Aeroplane Co., Ltd., Filton, Bristol.

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AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations : Cyl. = cylinder ; i.c. = internal combustion : m. = motor.
The numbers in brackets are those under which the Specifications will be printed and abridged. etc.

APPLIED FOR IN 1924

Published January 7, 1926

19,411. L. RENAULT. Distribution of load on aeroplanes. (223,198).
21,283. S. A. REED. Air propellers. (244,158.)
28,456. A. ROHRBACH. Steering-mechanism for flying-machines. (226,516.)

APPLIED FOR IN 1925

Published January 7, 1926

16,681. H. M. TAYLOR. Earth anchors. (238,197.)
17,035. R. ALKAN and G. LESOURD. Ring for suspending a mass to a device for dropping articles from aircraft. (236,575.)
21,707. J. E. BROYLES. Airships. (240,146.)

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FLIGHT BUYERS' GUIDE & TRADE DIRECTORY.

CLASSIFIED LIST OF LEADING MAKERS OF ALL GOODS PERTAINING TO AVIATION (for Details see Advertisers' Announcements).

ACETYLENE PLANT AND BLOWPIPES—
British Oxygen Co., Ltd., Angel Road, Upper Edmonton, London, N. 18.
Tottenham 37 (2 lines); 2488 (4 lines); "Britoxygen" Tottlane, London.

AEROPLANES, ENGINES AND SPARES—
A.D.C. Aircraft Ltd., Regent House, Kingsway.
Regent 6240 (3 lines); "Airdisco," Westcent.

AEROPLANE MANUFACTURERS—
Armstrong-Siddeley Motors Ltd., Coventry
Beardmore, Wm., & Co., Ltd., Dalmuir.
Blackburn Aeroplane and Motor Co., Ltd., Olympia, Leeds. Roundhay 601 (5 lines).
Boulton & Paul, Ltd., Norwich.
Norwich 851; "Boulton," Norwich.
Bristol Aeroplane Co., Ltd., Filton House, Filton, Bristol. Bristol 3906; "Aviation," Bristol.
De Havilland Aircraft Co., Ltd., Stag Lane Aerodrome, Edgware. Kingsbury 160.
Fairey Aviation Co., Hayes, Middlesex.
Hayes 136-7-8.
The Gloucestershire Aircraft Co., Ltd., Sunningend Works, Cheltenham.
Brockworth Aerodrome, Glos.
Cheltenham 1161-2-3-4.; "Glosaircra, Cheltenham."
Handley-Page, Ltd., Cricklewood.
Hampstead 7500.
H. G. Hawker Engineering Co., Ltd., Kingston-on-Thames. Kingston 1988.
N. V. Nederlandsche Vliegtuigenfabrick.
Rokin 84, Amsterdam.
Pander & Zonen, Zuid Binnensingel, Den Haag.
34160; "Pander."
Parnall, George, & Co., Coliseum Works, Park Row, Bristol.
4775 (2 lines); "Warplanes," Bristol.
Roe, A. V., Ltd., Manchester. City 8530, 8531, Manchester: "Triplane," Manchester.
Hamble, near Southampton:
Hamble 18: "Roe," Hamble.
Short Bros. (Rochester and Bedford), Ltd., Seaplane Works, Rochester, Kent.
Chatham 627; "Seaplanes," Rochester.
Supermarine Aviation Works, Ltd., The, Southampton.
Woolston 37; "Supermarin," Southampton.
Vickers, Ltd., Vickers House, Broadway, London, S.W. 1. Victoria 6900 (13 lines); "Vickers," Sowest, London.
Westland Aircraft Works, Yeovil.
Yeovil 141 (4 lines); "Aircraft, Yeovil."

ALUMINIUM SHEETS AND STRIPS—
British Aluminium Co., Ltd., The, Adelaide House, King William Street, E.C.4.
"Cryolite," Bilgate, London.

CLOTHING—
Burch's, 401, Strand, W.C.2. (Opposite Hotel Cecil). Gerrard 7861.

CORDS, TAPES, Etc.—
MacLennan, John, & Co., 115, Newgate St., E.C.1.
City 3115; "Vanduara," Cent, London.

DOPES—
British Celanese, Ltd., 8, Waterloo Place, London, S.W. 1. Regent 4045.
Cellon (Richmond) Ltd., Cellon Works, Petersham Road, Richmond. Richmond 2213 (2 lines); "Ajawb," Richmond, Surrey.
Neocellon, Ltd., Garratt Lane, London, S.W. 18.
Battersea 218; "Neocellon," Wands.
Titanine-Emaillite, Ltd., Empire House, 175, Piccadilly, London, W. 1. Gerrard 2312, Regent 4728; "Tetrafree," Piccy, Lond.

DURALUMIN—
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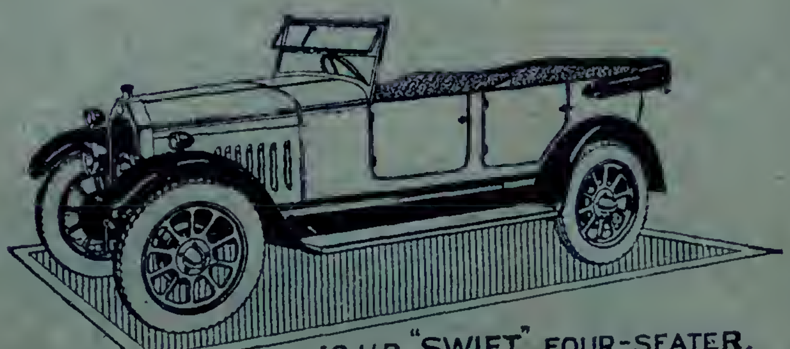

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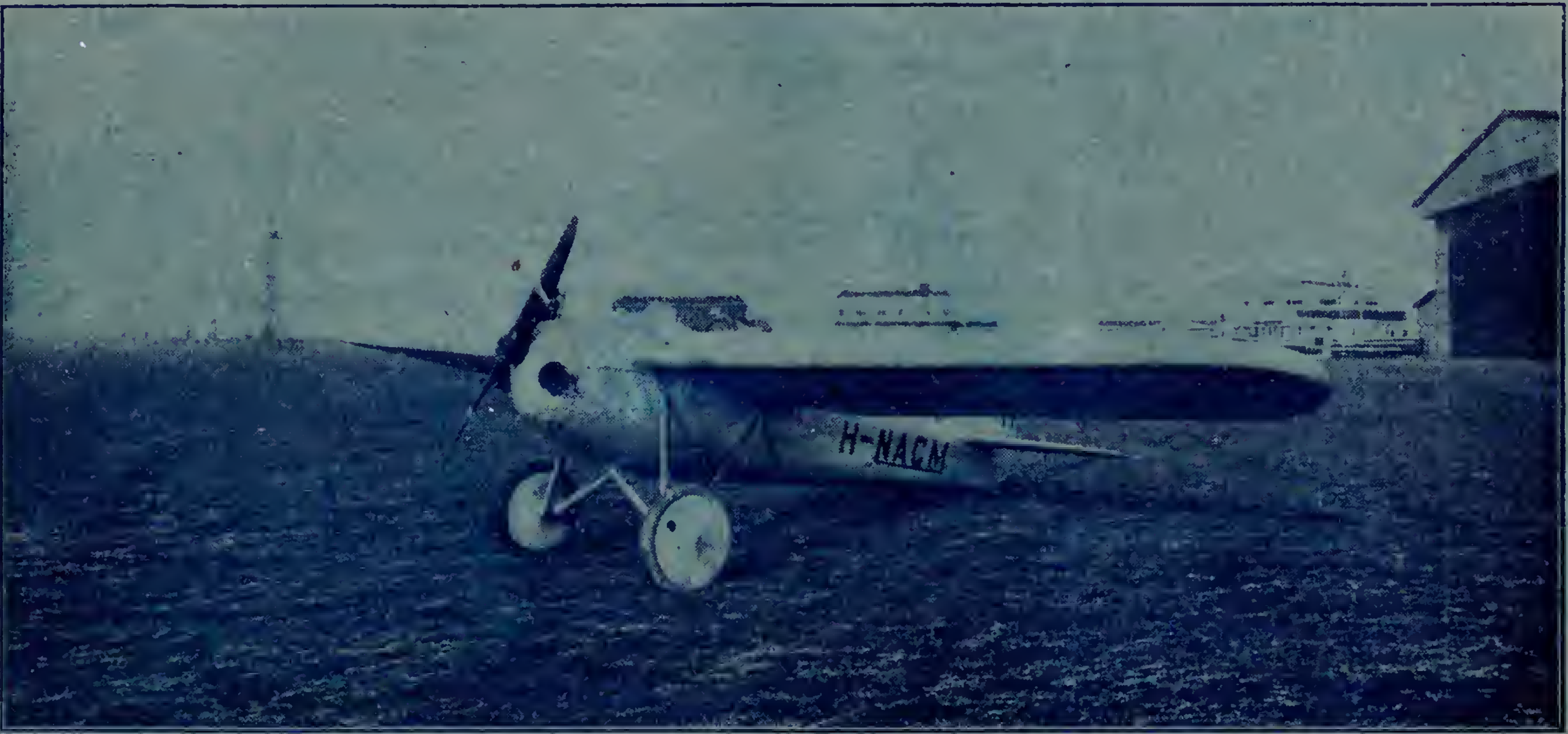

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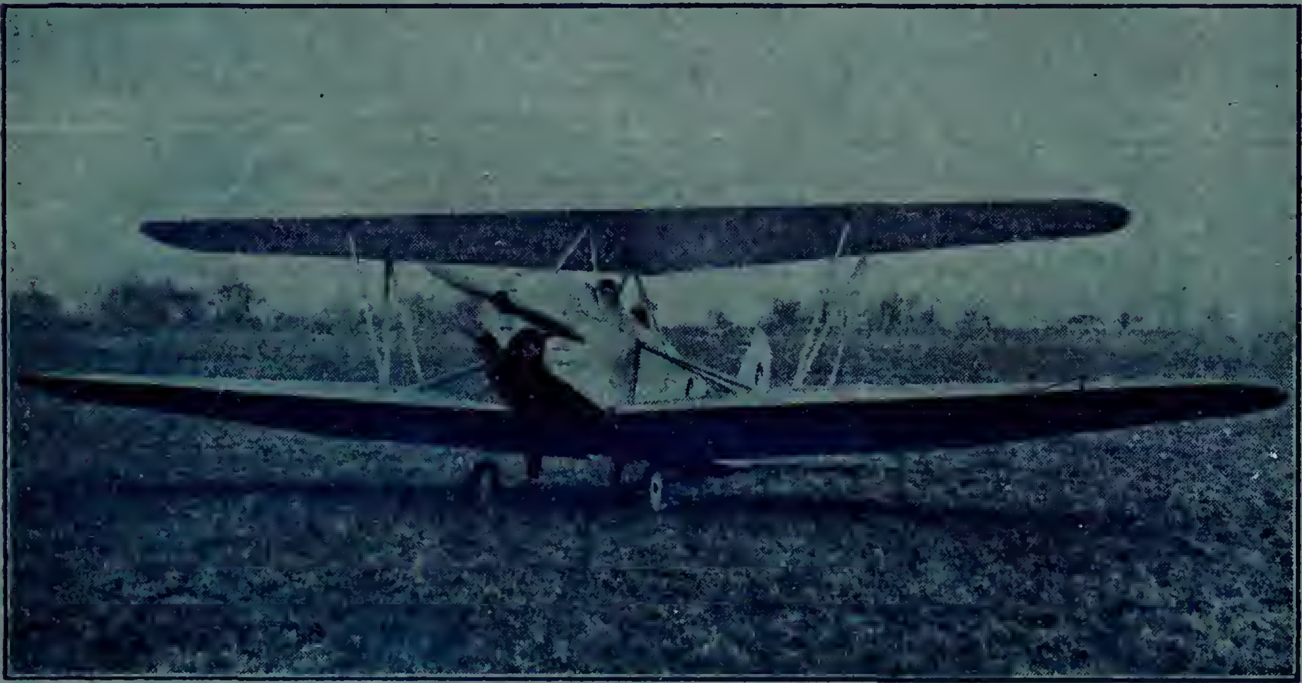

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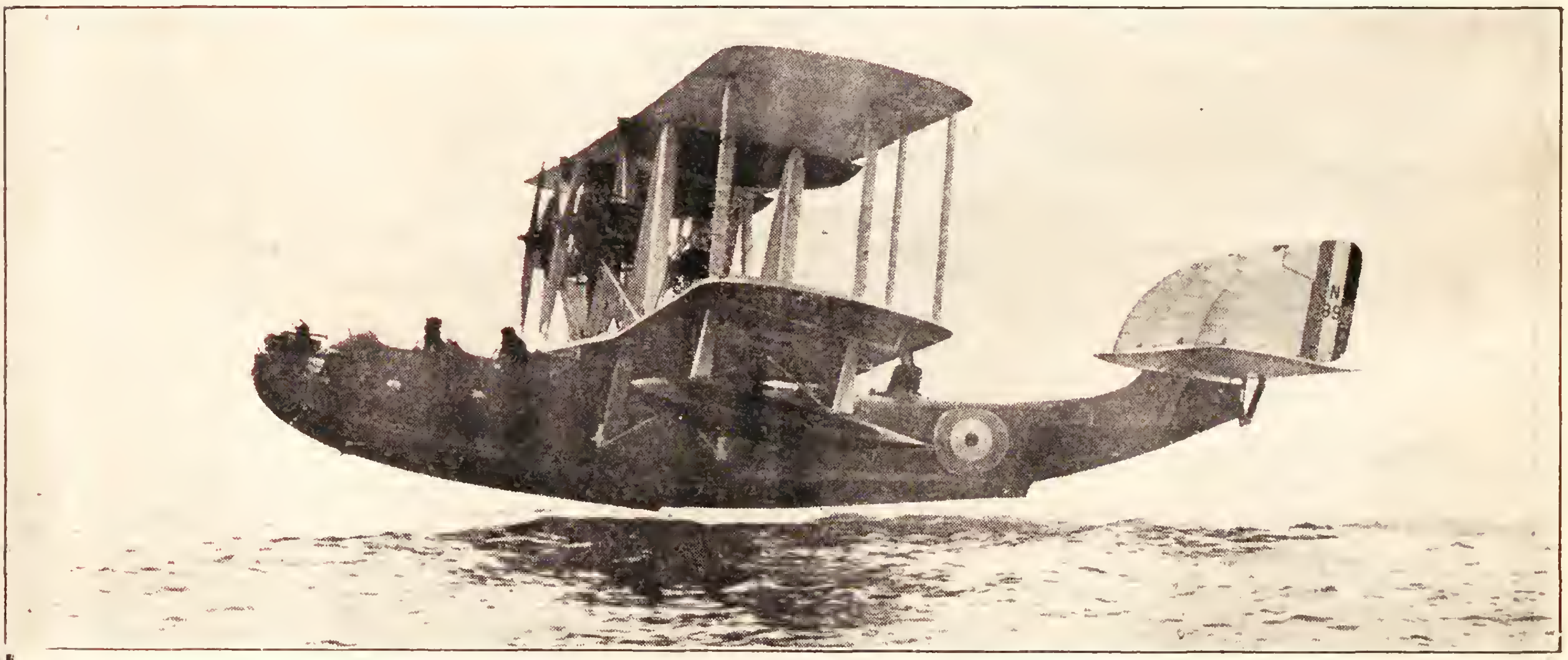

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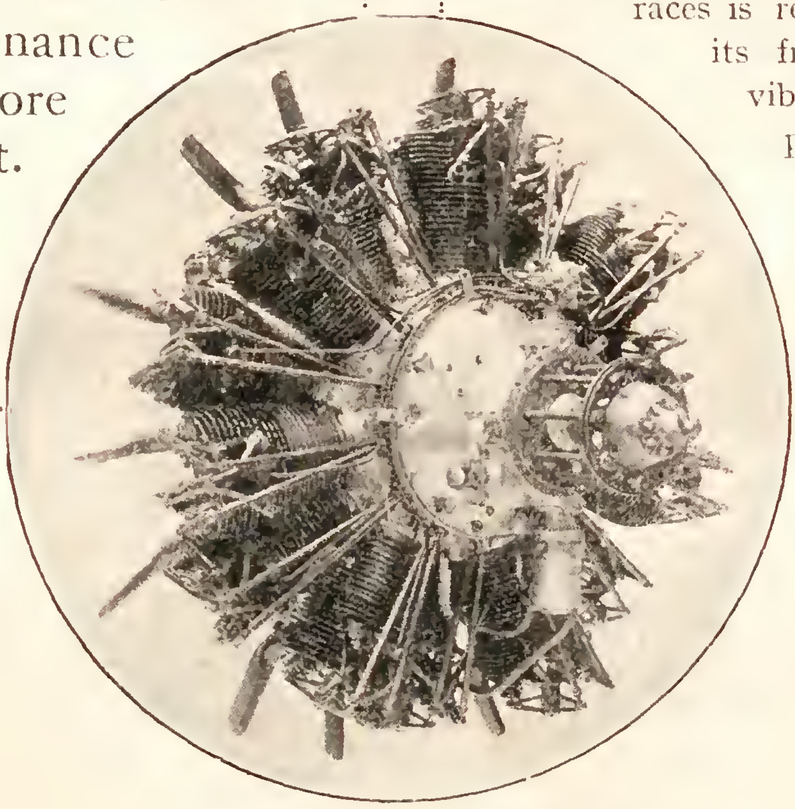

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CONTENTS

Editorial Comment PAGE
Propaganda ... 15
Purchasing Foreign Aircraft ... 16
More "Economy" ... 16
The Next Schneider Cup Race ... 16
Manœuvrability ... 17
Light 'Plane Club Doings ... 18
The Bristol "Cherub" Series III ... 19
Experimental Stress Analysis ... 22
Air Lines in South Russia ... 23
Personals ... 24
Royal Air Force ... 25
R.A.F. Intelligence ... 25
Air Post Stamps ... 26

DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:—

1926	
Jan. 21	Maj. J. S. Buchanan. "The Schneider Cup Race, 1925," before R.Ae.S.
Jan. 26	Lieut. Olechnovitch. "The Care and Maintenance of Tools as an Important Factor in Workshop Routine," before Inst.Ae.E.
Feb. 4	Joint Meeting of R.Ae.S. and Inst.Ae.E. at R. Soc. of Arts. Mr. C. L. Lawrance, "American Aircraft Engine Development."
Feb. 9	Informal Meeting, Inst.Ae.E.
Feb. 25	Mr. A. J. Cobham. "Long-Distance Aeroplane Flights," before R.Ae.S.
Mar. 4	Maj. G. H. Scott. "Development of Airship Mooring," before R.Ae.S.
Mar. 9	Mr. O. E. Simmonds, M.Ai, A.F.R.Ae.S., M.I.Ae.S. "The Development of Civil Marine Aircraft," before Inst.Ae.E.
Mar. 13	Flight-Lieut. H. Cooch. "Landing Aeroplanes in Fog," before R.Ae.S.
April 13	Mr. S. H. Evans, B.Sc. "The Performance of Modern Aircraft—with special reference to the Variable Wing," before Inst.Ae.E.

EDITORIAL COMMENT.

Propaganda

IT is by now an open secret that one of the main causes of the recent amalgamation into one company of the two leading German air transport companies, the *Junkers Luftverkehr* and the *Deutscher Aero-Lloyd,* was the virtual failure of the Junkers concern, due, it is stated in some quarters, to extravagant management. There has been a perfect flood of correspondence on the subject in the German press, daily as well as aeronautical, and feeling has run high, with all sorts of accusations, denials, praises and criticisms. Into this mêlée we do not feel called upon to be drawn. The matter is mainly one for Germany to settle, but that the accusations of bad management cannot very well apply to *all* the Junkers departments is forcibly brought home to one by a recent example of the methods of the *Propaganda Abteilung.*

This takes the form of a supplement to the *Deutsche Motor-Zeitschrift* of December, 1925, in which a brief outline is given of the evolution of the Junkers type of construction from the earliest days to the present time, and concluding with illustrations and particulars of a number of Junkers aeroplanes. The point about the supplement is that it is published in English, and very good English too, even to the extent of using English aeronautical slang terms such as "soggy," if such can be called good English. The supplement is produced on good paper and the illustrations are well printed and very clear. The machine descriptions are confined to a page per machine, with an illustration of the machine at the top of the page and the data relating to the type given in more or less tabular form. As the constructional methods are much the same in all Junkers types, the introduction and historical part covers the fundamental principle, and the tabulated data and photographs give the information necessary to describe the characteristics of each type. The supplement is a most excellent piece of propaganda for Junkers aircraft, and although it may be a part of the extravagant management, it does not point to ineffectual management, in this particular department at any rate.

The extensive use of Junkers aircraft in various parts of the world is evidence of the effectiveness of this propaganda, of which, of course, the supplement is but one small item, but one which is rather illuminating.

* * *

Purchasing Foreign Aircraft

During the recent discussion on the French aeronautical budget a question was raised which had already been discussed in private for a considerable time. It relates to the suggested purchase by the French Government of foreign aeroplanes. Two members of the French parliament, MM. Henry Paté and Couhé, have made themselves spokesmen for the movement which maintains that it is to the interest of French aviation generally to know exactly the capabilities of foreign aircraft, and that the only way to find these out definitely is to purchase foreign machines and test them under the same conditions as French machines. By such tests the *Service Technique* would, it is claimed, be able to verify the accuracy of the performances claimed for the foreign machines, the information being made available to French aircraft constructors.

Our excellent French contemporary *Les Ailes*, while agreeing with the necessity of knowing exactly what foreign machines are capable of, foresees difficulties, and suggests that a better way might be to admit foreign aeroplanes to French competitions. It expresses the belief that foreign aircraft constructors might, if they knew for what purpose their machine was required, very well refuse to sell, as there would be no likelihood of further orders, and in that case the otherwise excellent suggestions made by MM. Paté and Couhé would fall to the ground. *Les Ailes* states that it knows of French aircraft constructors who refused to sell three aeroplanes of the *avion de chasse* type to an allied government, knowing that two of them would be used for flight tests and the third would be taken to pieces for detail examination. Our contemporary thinks that in all probability a similar attitude might be taken by foreign aircraft constructors asked to sell machines to the French government.

Les Ailes believes that a solution of the problem is not impossible, and that the subject should be seriously studied. In the meantime, it suggests that a good beginning might be made by France renouncing her present policy of keeping her aviation competitions exclusively national, and instead inviting foreign constructors to take part in them. It points out that there is no valid reason why, in like manner to the Paris Salons, a commercial aircraft competition, a seaplane competition or a competition for touring machines, should not be international. Foreign constructors would find it to their own interests to participate and to get the utmost from their machines. The interests of the French aviation world would be served by challenging comparison and benefiting from the results.

The problem outlined above is not, of course, peculiar to France, but is equally applicable to Great Britain, and if one were to substitute, in the above, Great Britain for France, exactly the same case can be made out. We in this country have for some time been purchasing "samples" of foreign aircraft, but the practical difficulties are exactly as outlined by our French contemporary. We do not propose to offer a solution, but the problem is one which requires study and very careful and diplomatic handling.

* * *

More "Economy"

"The axe" is a little-heard of implement these days, but the cry for "economy" is, like the poor, always with us. The latest subject upon which the economists are exercising their ingenuity is that of airship operation. At Pulham and at Cardington men are being dismissed "indefinitely," the proposed reconditioning of R.36 for the purpose of fitting out this airship for a flight to Egypt has been abandoned, and the flying tests, for which R.33 had been prepared, to be carried out in order to compile data urgently required in the design of the new large airships, are to be discontinued. We doubt if the world has ever seen a sorrier spectacle than that of Great Britain playing with airship policies. First we will and then we won't. First the Admiralty refuses to have anything to do with airships, then it is suddenly seized with a violent craving for airships. First the Air Ministry turns down airships as being too costly; then when the Admiralty shows signs of awakening interest, the Air Ministry discovers that it *can* manage an airship policy. Then we go off the deep end and "talk big" about 5,000,000 cubic ft. airships. Then our airship authorities say that the building of such large airships will require first a certain amount of full-scale experimenting. The work is taken in hand and a start is made. Another change of mind, and airship flying is once more closed down. Really it is difficult to know whether to laugh or cry.

Although it is stated that the work on the large 5,000,000 cubic ft. R.101 is to continue, it must be realised that actual flying with existing airships is essential, not only in order to accumulate data, but also for the training of crews. Perhaps, after all, Commander Boothby's suggested light airship club may provide the means of a continuance of airship flying, even if under a somewhat different form, especially as his scheme does not involve any but a very modest expenditure. Otherwise, after all the vacillation shown during the last few years, one is almost tempted to suggest handing the whole of the airship work over to the Navy.

* * *

The Next Schneider Cup Race

We are very glad that the suggestion, made at the meeting of the F.A.I. in Paris recently, that the rules for the next Schneider Cup Race be altered to stipulate that the machines must carry, in addition to the weight of the pilot and the fuel necessary for the race, a certain useful load, was turned down. As we have repeatedly stated, we do not agree with the view that pure speed races are of no value and tend only to produce "freaks." But for such races we should never have evolved machines capable of the speeds now being attained, and as the Schneider race is almost the only international event for pure speed machines, it would, in our opinion, have been a mistake to alter the rules so as to call for larger, heavier, and therefore slower machines. That the rules were not changed is, of course, chiefly due to the firm stand taken by Great Britain's representatives at the meeting of the F.A.I., and we believe that ultimately they will be thanked for this attitude, even by those who now desire to make a change.

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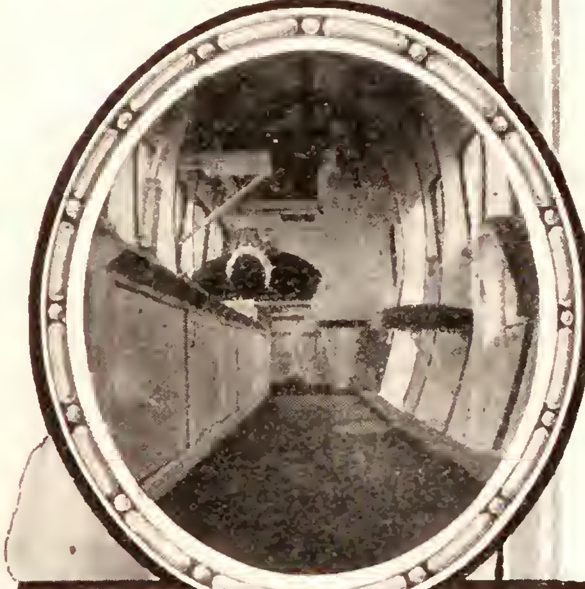

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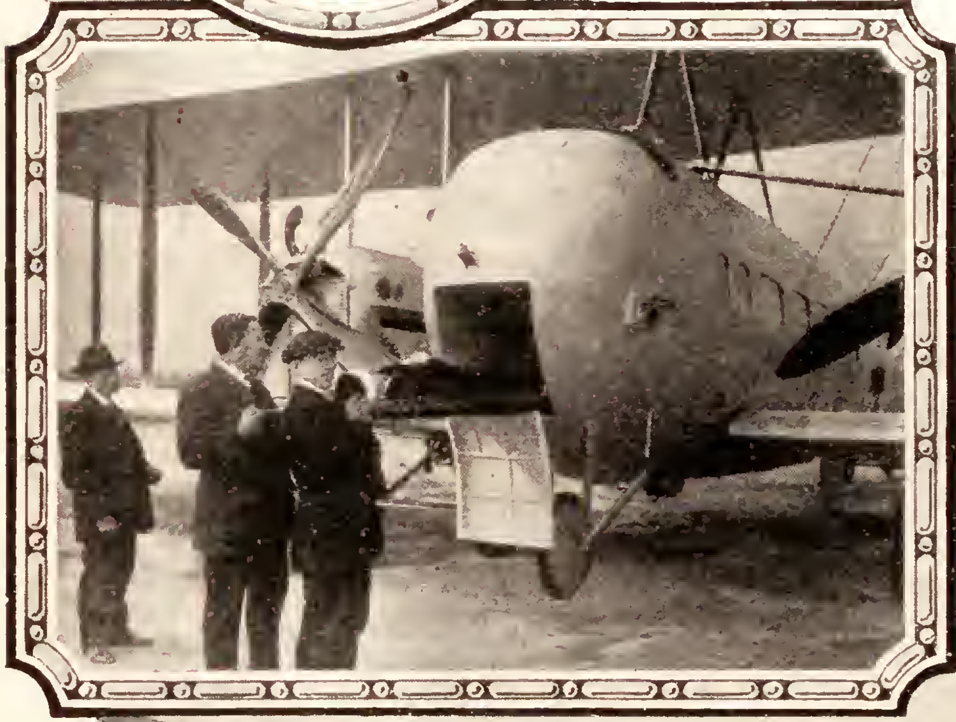

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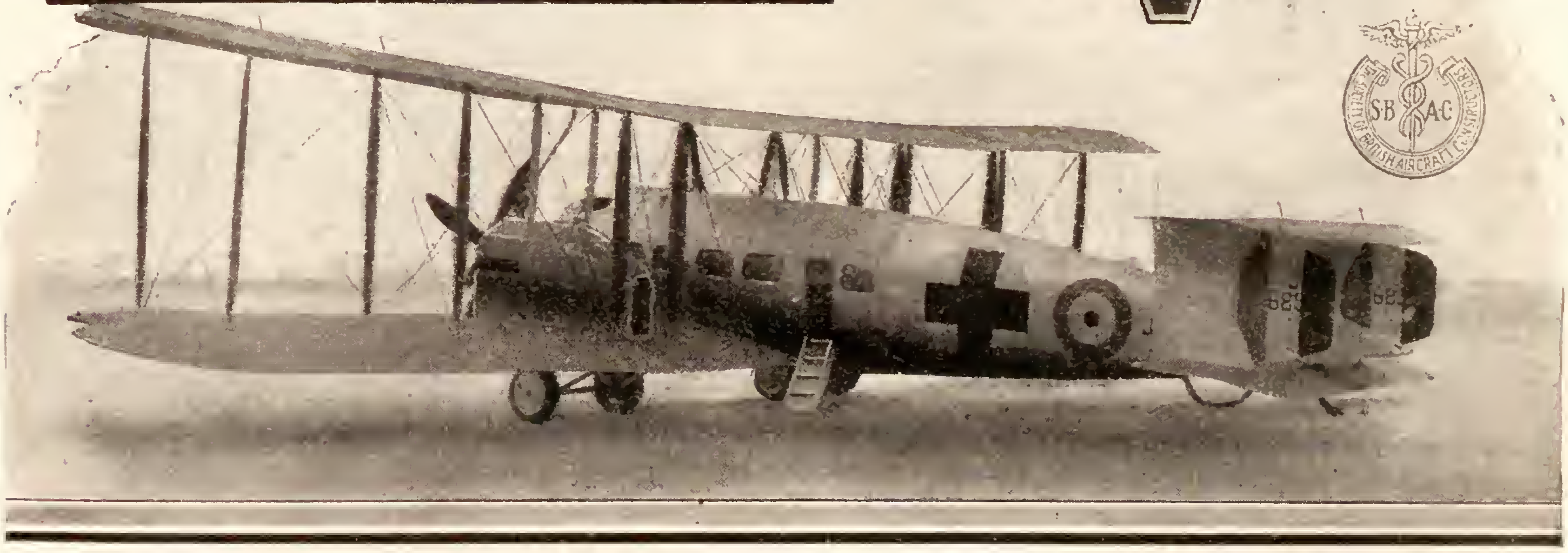

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(*Extract.*)

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"There is no doubt that the engine is behaving like one with years of development behind it."

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"I enclose a table showing the flying carried out by the London Aeroplane Club, from the 19th August to the 30th November, on the two D.H. 'MOTHS,' fitted with 27/60 h.p. CIRRUS engines.

"From this table you will see that flying was carried out on 72 days and that 729 flights were made, resulting in a total flying time of 298 hours 45 minutes.

"We are extremely satisfied with the performance of the two CIRRUS engines supplied by you in the D.H. 'MOTHS.' The only trouble we have experienced with these engines is with the valve seatings, but the modification you made has entirely corrected it.

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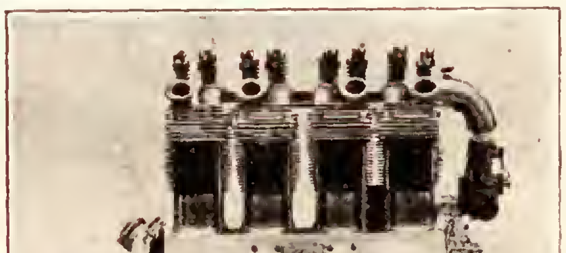
(*Extract.*)

"The Cirrus engines fitted to the machines have proved exceptionally reliable and economical.

"The only replacements necessary on the two engines have been two new cylinder heads, the valve seatings of which were found by the representative of the A.D.C. Aircraft, Ltd., when carrying out a modification, to have moved an almost inappreciable amount in the cylinder heads. The particular engine in which this very slight defect, which was not noticeable in running, was found had done 49·5 flying hours, and 58 hours total running.

"No other replacements whatsoever have been necessary on either engine, although over 100 hours flying has been done."



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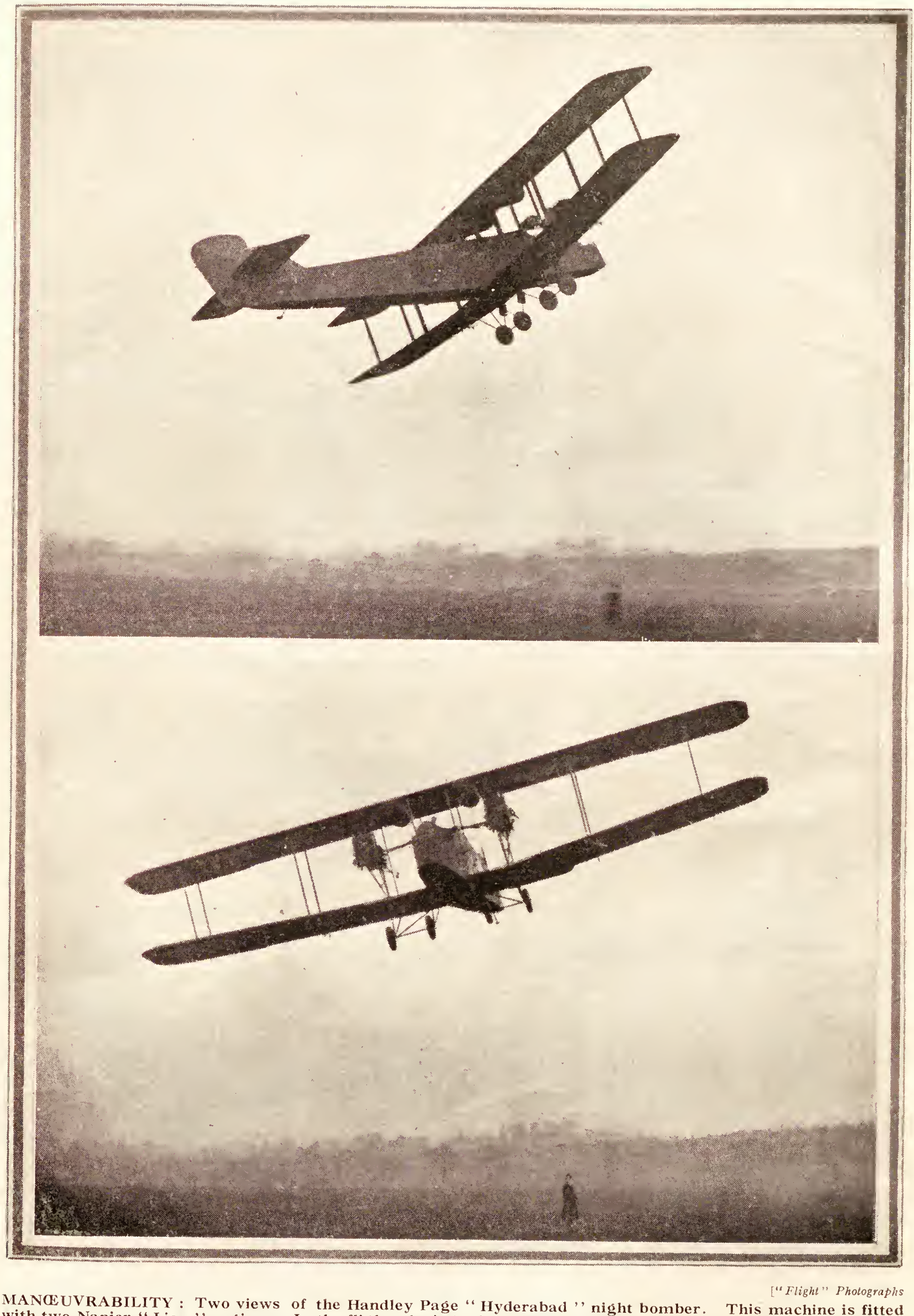


["Flight" Photographs

MANŒUVRABILITY : Two views of the Handley Page "Hyderabad" night bomber. This machine is fitted with two Napier "Lion" engines. In the flights during which these photographs were taken the machine was piloted by Capt. Wilcockson, who seemed to handle the "Hyderabad" as if it were a scout.

LIGHT 'PLANE CLUB DOINGS

London Aeroplane Club

THE following Members received flying instruction during the week:—Mrs. Eliott-Lynn, C. E. Murrell, R. C. Presland, R. V. Banks, Major Beaumont, G. N. Howe, D. P. H. Esler, S. O. Bradshaw, T. C. Angus, N. Jones, O. J. Tapper, R. C. Brighton, G. W. Quirk, R. L. Preston, S. C. Richards, R. P. Cooper, E. S. Brough, R. Thomas, A. P. Hunt, A. R. Ogston, L. J. C. Mitchell.

The following Members flew solo:—Mrs. Eliott-Lynn, Major Beaumont, Col. Turner, G. H. Craig.

The total flying for the week was 17 hours 40 mins.

On Friday, 8th inst, Col. Turner, in carrying out his tests for his Aviator's Certificate, damaged G-EBLU. The figures of eight and landings had been carried out satisfactorily, and the altitude test of 6,000 ft. was completed, and he was alighting with engine cut off. He made a gentle side slip to lose height on approaching the aerodrome, and the lower wing and under-carriage fouled a high part of the aerodrome hedge. The machine swung round immediately into the ground, and was considerably damaged.

Immediately afterwards Major K. M. Beaumont, D.S.O., took out the other "Moth," G-EBLI, and carried out his tests for the Aviator's Certificate in a satisfactory manner.

The extent of the damage to G-EBLU has not yet been definitely ascertained, but in any event it will mean carrying on with one machine for the next few weeks.

Capt. F. G. M. Sparks is taking his Instructor's Course at Upavon, commencing on Monday, January 11, and will be away from Stag Lane for the next fortnight.

The Lancashire Aero Club

FLYING has been possible on only Saturday and Sunday. Mr. Cantrill gave "dual" instruction to:—S. Parker, 20 mins.; T. Wilkinson, 20 mins.; H. Hardy, 20 mins.; J. Leeming, 20 mins.; P. Michelson, 25 mins. Mr. Scholes instructed:—M. Lacayo, 35 mins.; H. Stern, 30 mins.; W. Colley, 25 mins.; P. Tummers, 25 mins.; T. Wilkinson, 20 mins.; S. Crabtree, 20 mins.

Total time flown: 45 hours 55 mins. Ten persons had instruction.

"Joy Rides" are given to members only on the last Saturday of each month, the rest of the time machines are kept exclusively for dual instruction and pupils' solo. Flying Members are asked to note that there are now vacancies on the Instructor's Lists, and those wishing to commence should attend at the Aerodrome to make arrangements. All Flying Members are eligible for instruction.

The Club's Avro presented by Col. M. O. Darby is being reconditioned, and it is hoped will be flying shortly. Early delivery has been promised of the Avro given by Sir Wm. Letts, and also the "Moth" presented by Sir Charles Wakefield. The solo pilots may stop worrying about any shortage of machines in the spring. They forecast gloomily visions of hordes of members swarming down on the aerodrome when the spring arrives, and of themselves fighting a desperate battle to retain a machine from the grasp of these rapacious pupils. We wish to point out to them that there will be three "Moths" and two Avros in use, so that they will have a chance of a flight. Should there prove a shortage of machines, the Club's tame "Gift enticer" may be relied upon to discover further generously-minded citizens.

The Newcastle-upon-Tyne Aero Club

FLYING REPORT for week ending Sunday, January 10, 1926:—Total flying times: LX, 18–36; LY, 5–11; total, 23 hrs. 47 mins.

The following members had dual instruction under Major Packman:—

Mr. H. H. Leech (32 mins.), Mr. J. M. Davidson (3 hrs. 52 mins.).

Mr. A. E. George (30 mins.), Mr. J. A. Somerville (2 hrs. 20 mins.).

Mr. G. H. Twine (30 mins.), Mr. L. Smith (30 mins.), Mr. A. D. Bruce (15 mins.), Mr. C. Thompson (25 mins.).

Secondary dual instruction.—Mr. Leech (1 hr. 35 mins.), Mr. W. T. Walton (1 hr. 22 mins.)., Mr. Stobie (10 mins.), Mr. J. D. Irving (45 mins.), Mr. R. N. Thompson (35 mins.). Solo: Mr. Leech (10 mins., first solo), Mr. Walton (2 hrs. 10 mins.), Mr. J. D. Irving (1 hr. 50 mins.), Mr. R. N. Thompson (2 hrs. 53 mins., includes tests for Pilot's Certificate). Flights by "A" Pilots: Mr. Stobie (50 mins., 2 flights), Mr. Baxter Ellis, with Mr. A. M. Sutherland as passenger (48 mins.), Mr. N. S. Todd (15 mins.), Mr. Forsyth Heppell, 30 mins, with Mr. Young as passenger, 20 with Mrs. Heppell, and 10 with Miss Coppett. Tests by Major Packman, 15 mins. Passenger flights with Major Packman: Miss Zollner, Miss Noble and Lieut. Bridges, each 5 mins.

The weather mixture this week has consisted of fairly equal parts of fog, rain and high winds, but a lot of very useful flying has been carried out, though Thursday was a blank day.

Tuesday was an important day in the history of the Club, it being the first occasion on which two members have been "launched" solo on the same day. Mr. J. D. Irving and Mr. H. H. Leech, each making their first flights alone, and both made very good performances. Mr. R. N. Thompson carried out the first part of his tests for his Pilot's Certificate, making his figures of eight in grand style.

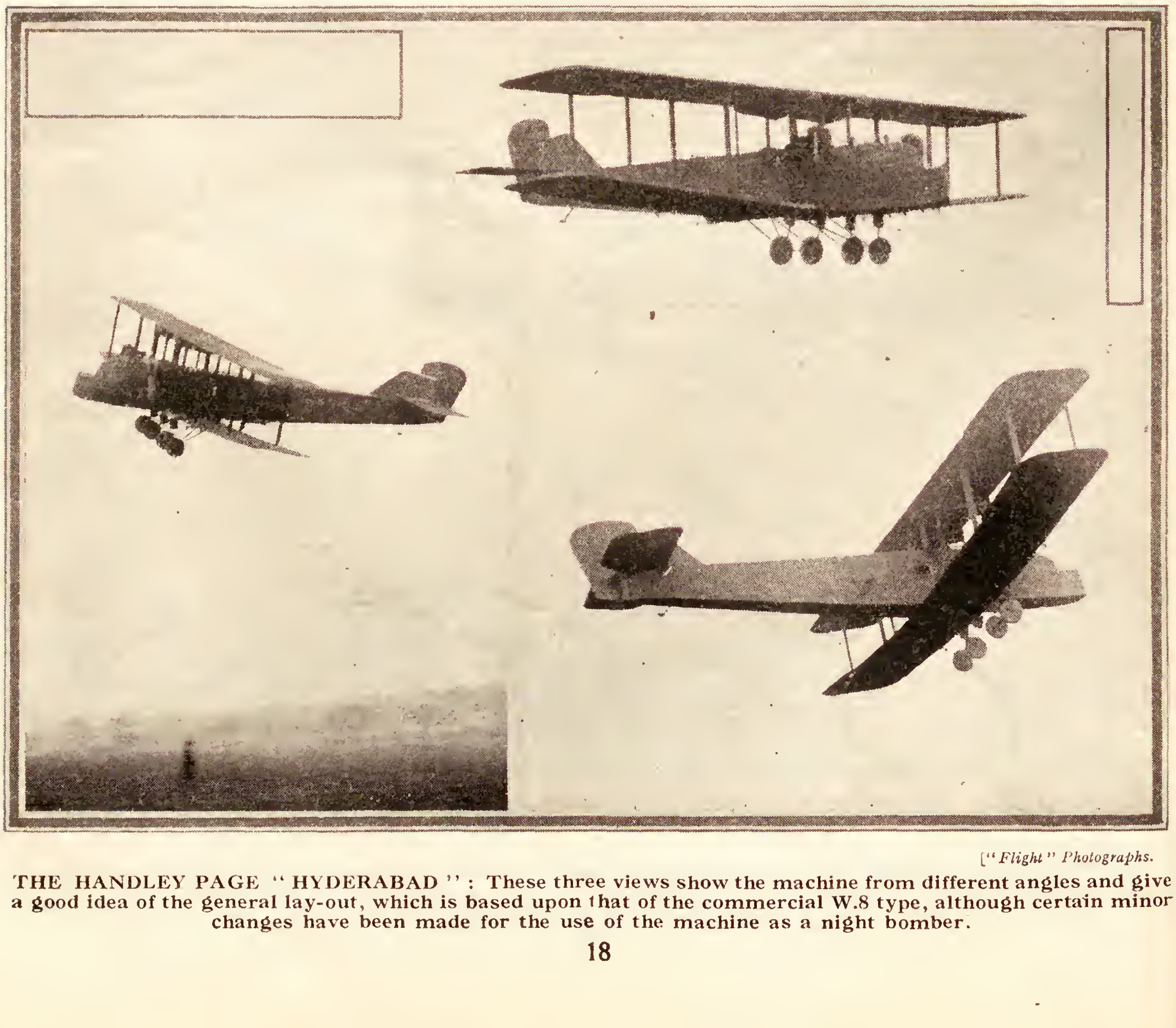
Wednesday was also an historical day, as this was the first time a member had dared to shed an undercarriage. The honour goes to Mr. Irving, who, after making his third solo of 45 minutes in excellent style, misjudged his landing, with the usual result. Mr. Irving has taken matters very seriously throughout, having been in no hurry to fly alone, and has put in a lot of dual flying, including dozens of landings almost faultlessly, and it is just a piece of bad luck. Mr. Irving was back at it on Saturday, and in the course of a flight with Major Packman, made very good landings every time.

The Club is now reduced to one Moth, the hardy LX (and the "Gull," which, like all good aeroplanes, is held up until the engine, which is being overhauled, arrives), but there has been a good attendance of members and, since the accident nearly 15 of the 23 hours for the week have been flown.

Mr. Thompson carried out the second part of his tests in good style.

The reason he was unable to complete all his tests on Tuesday was that while he was doing his figures of eight the visibility became so bad that it was impossible for him to see one turning point from the other, and just in case the observer might have any doubt that he had correctly turned one point at any time, he proceeded after completing five to "do a few more," finally, completing 10 figure eights. Wednesday being much better, he carried out his height test.

Mr. MacKay, Mr. Walton and Mr. Leech now only await suitable weather to complete their tests, so LY should be kept very busy when she returns from the hospital. The four "A" pilots of the Club have all flown during the past week.



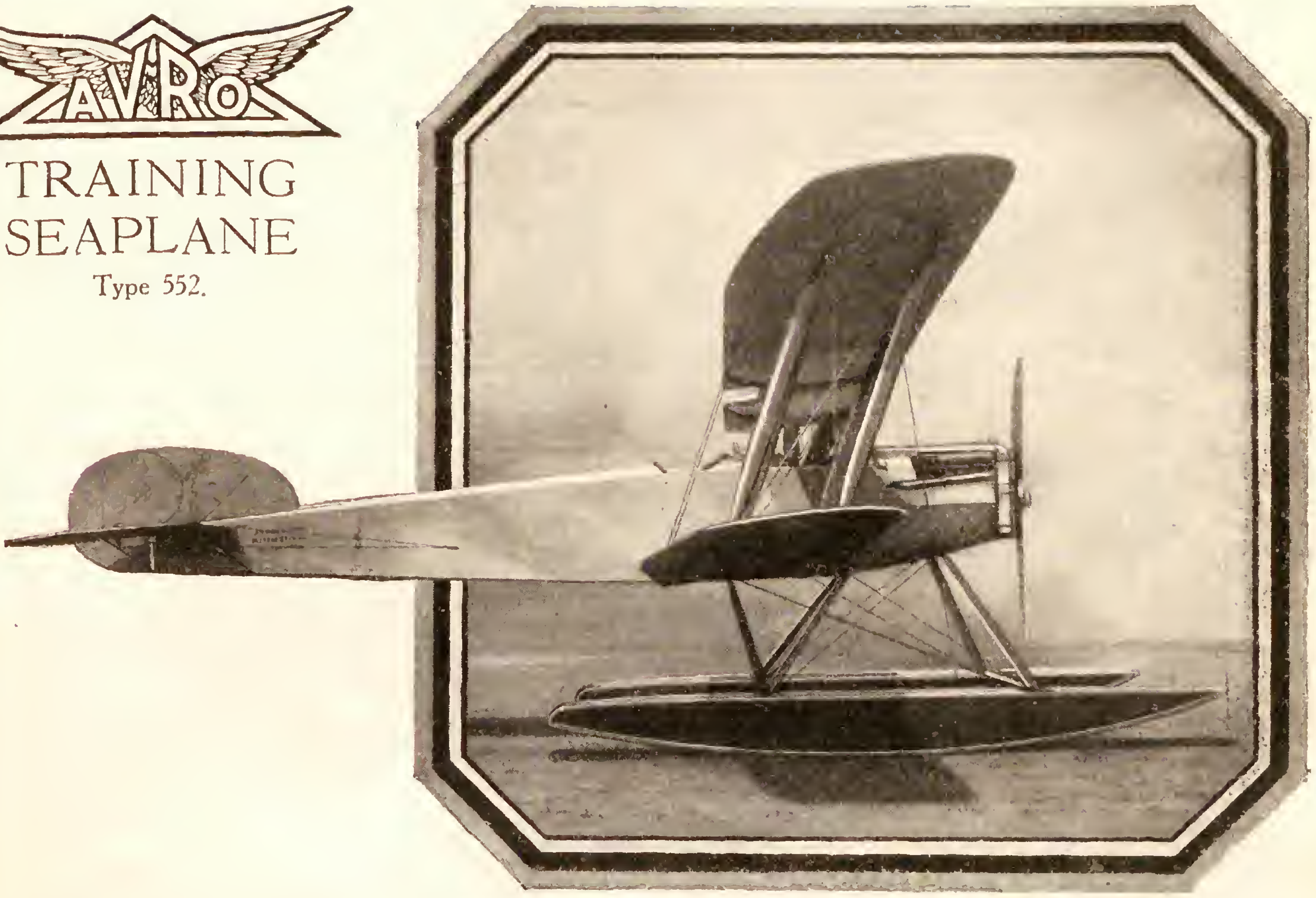
[*"Flight" Photographs.*

THE HANDLEY PAGE "HYDERABAD": These three views show the machine from different angles and give a good idea of the general lay-out, which is based upon that of the commercial W.8 type, although certain minor changes have been made for the use of the machine as a night bomber.

AVRO

TRAINING SEAPLANE

Type 552.



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Its water cooled engine makes it a desirable alternative for purposes or climates where an air cooled rotary engine is undesirable or unsuitable. The floats, which are constructed of double skin mahogany and are boat built, are the result of considerable experiment and are very efficient.

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The engine (Wolseley "Viper" 210 h.p.) is extremely reliable, easy to control, and accessible. It is fitted with a hand starter operated from the cockpit.

The machine is very sensitive to the controls and carries out all evolutions and manœuvres cleanly and well. A feature of note is the quickness with which it takes off from water. Properly handled it can take off in approximately 20 seconds.

The undercarriage attachments are arranged so that either a land or sea undercarriage can be fitted, thus adapting the machine for use in either capacity. Anchor and mooring ropes are provided.

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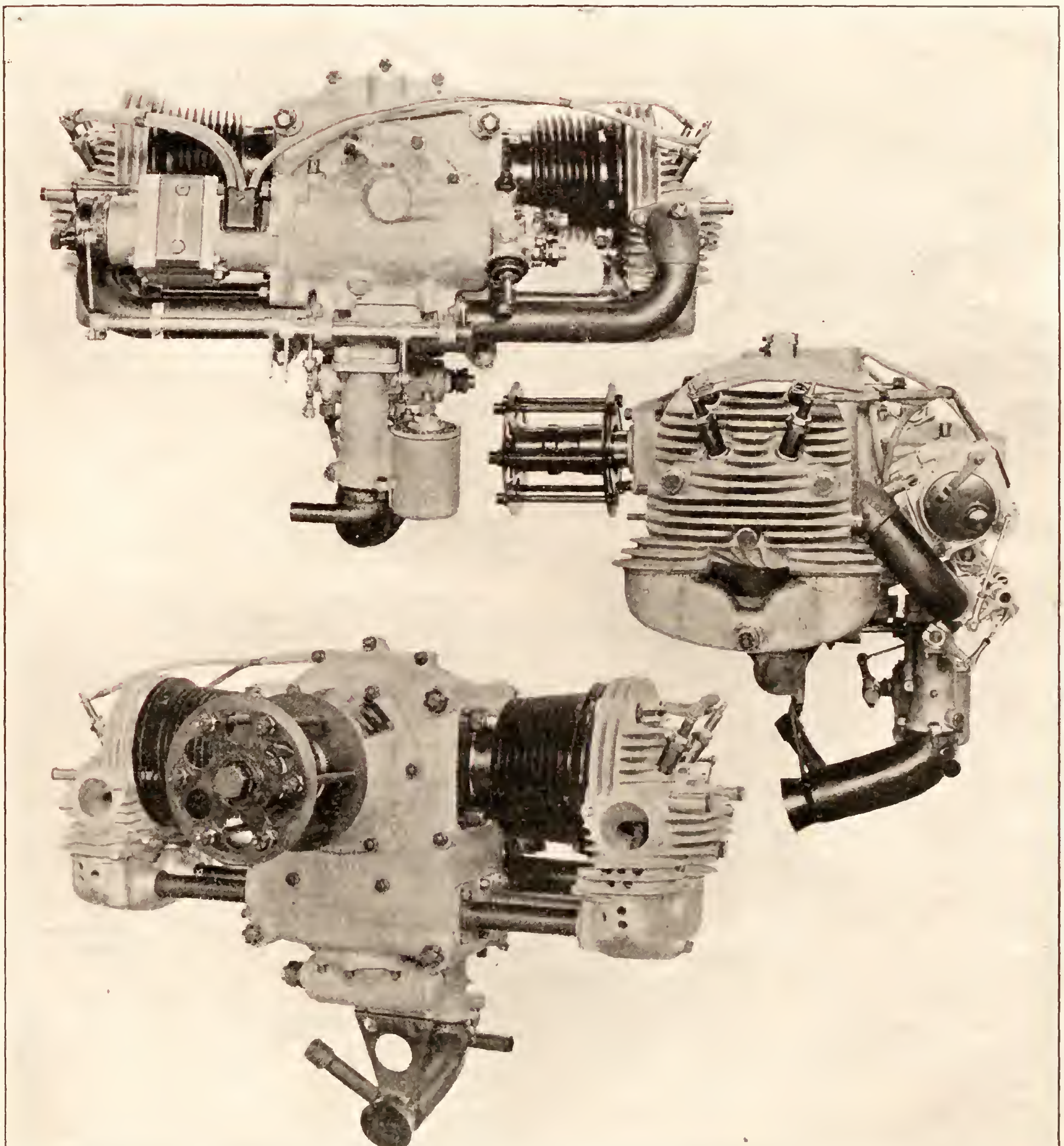
THE NEW BRISTOL "CHERUB"

Series III Light 'Plane Engine Passes 100 Hours Type Tests

As a result of the outstanding successes of the original Bristol "Cherub" engines in the 1924 and 1925 Lympne Light 'Plane meetings, and other competitions in Germany and the United States of America, the Bristol Aeroplane Company decided to develop this engine further, with the idea of putting it on a basis fully equal to the best modern large aero engines as regards reliability and performance. Although there were those who doubted the possibility of obtaining real reliability in a small very high speed light 'plane engine, the Bristol Company has managed, by taking advantage of their valuable experience gained in competition work, by careful re-designing, and as a result of nine months of development work, to produce a small light engine, which compares well with aero engines of more than ten times the power. Thus the "Cherub" series III develops a normal power of 33 b.h.p. at 2,900 r.p.m., and a maximum of 36 b.h.p. at 3,200 r.p.m. The weight of the engine is only 95 lb., or 2·88 lb. per h.p. on normal power. At the same time the fuel and oil consumptions are low, the former averaging 2 galls. per hour and the latter 1 pint per hour, both at normal speed and power. That the reliability claimed for it has been attained in the "Cherub" III is proved by the fact that one of these engines has passed



THE LATEST "CHERUB": These three views illustrate the Series III engine, which has recently passed the Air Ministry's 100 hours' type test.

the 100 hours type tests imposed by the Air Ministry. Any engine capable of passing successfully this severe test may be assumed to have left the experimental stage behind it.

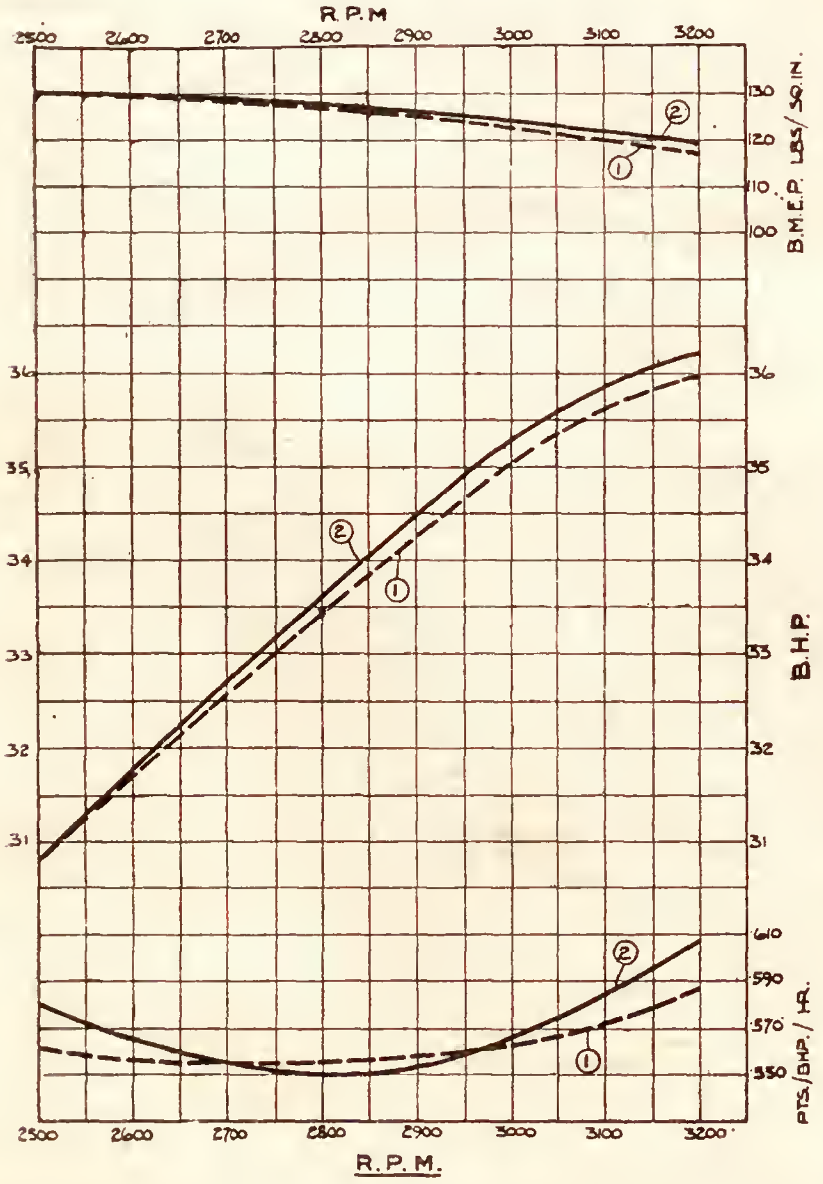
Changes in Design.

A brief outline of the changes in design which have been incorporated in the series III "Cherub" may be of interest, the older "Cherub" being already familiar to readers of Flight. To begin with, the bore has been increased to 90 mm. and the capacity to 1,228 c.c. The cylinder heads have been re-designed, and have new type valves with triple-valve springs. An extra gas ring has been added to the pistons, and a scraper ring of new design is used. The crankcase has been re-designed with dry sump, and is now more robust, smaller and more symmetrical. There is now a full floating bush big end bearing, and the lubrication system is of the full pressure type by engine-driven duplex gear pump, one suction and one pressure unit. The rear of the engine has been modified to allow easier attachment of engine mounting, and a special "Cherub" type of Zenith carburettor is tucked up more snugly to the engine, with new float mechanism. The ignition control is automatic, inter-connected with the throttle. The altitude control is inter-connected with the throttle so as to ensure automatic return to ground position when throttle is closed.

The Type Tests.

Concerning the Air Ministry Type Tests, which took place in December last, the essential information may, perhaps, best be given in the form of tables. One of our illustrations this week shows the power, etc. curves taken before and after the type tests, from which it will be seen that the power given at the end of the 100 hours was greater than before the test. Attention may also be drawn to the fact that the official report on the condition of the engine after being stripped stated that "The general condition of the engine was excellent."

A synopsis of the type tests is as follows: First run of 1½ hours on Froude dynamometer, during which the first power curve was taken; 40 hours on Froude at 90 per cent. power at 2,900 r.p.m.; 50 hours on hangar at 90 per cent. power, at 2,900 r.p.m.; 9 hours on Froude at 90 per cent. power and 2,900 r.p.m.; 1 hour on Froude at full power and 2,900 r.p.m.; 1 hour on Froude at high speed of 3,350 r.p.m.; 10 mins. on Froude, slow-running at 890 r.p.m.; 1 hour on Froude, high power of 36·9 b.h.p., at 3,190 r.p.m.; and finally 1½ hours on Froude, during which second power curve was taken.



Power curves of the Bristol "Cherub," Series III: Curves No. 1 show readings taken before the 100 hours type tests, and curves No. 2 readings taken after the type tests. The fuel used was 60 per cent. petrol and 40 per cent. benzol.

Details of 100 hours Test at 2,900 r.p.m.

The following table shows particulars of the 100 hours test:

Run	Hours. non-stop.	Power at End.	Average Consumptions. Fuel. Gals./h.	Fuel. Pts./hp./h.	Oil. Pts./h.	Oil. Pts./h.p./h.
1	10	34·2	1·94	0·59	1·22	0·046
2	10	34·5	1·9	0·58	0·98	0·037
3	10	34·5	1·9	0·58	0·612	0·023
4	10	34·2	1·93	0·59	0·570	0·022
5	10	Hangar	1·94	—	0·625	—
6	10	Hangar	1·94	—	0·75	—
7	10	Hangar	1·92	—	0·56	—
8	10	Hangar	1·91	—	0·48	—
9	10	Hangar	1·94	—	0·42	—
10*	10	34·2	1·91	0·58	0·58	0·022

* The last hour of this run was at full power. The fuel used was 60 per cent. petrol and 40 per cent. benzol. The average consumptions for the 100 hours were: Fuel, 1·92 gals. per hour = 0·586 pts./hp./h. Oil: 0·68 pints per hour = 0·026 pts./h.p./h.

The following table shows the average wear on major components during the 100 hours' type tests:—

Component.	Average Wear.
Cylinder Bore	0·001
Piston Skirt	0·0015
Piston Pin Bore	Nil
Gudgeon Pin Diameter	Nil
Con. Rod Small End Bush Bore	0·0027
Con. Rod Big End Bush Bore	Nil
Crankpin Floating Bush O/Dia.	Nil
Crankpin Floating Bush I/Dia.	0·0007
Crankpin Diameter	0·0003
Crankshaft Rear End	Nil
Cam Timing Internal Wheel	0·0001
Camshaft	0·0002
Rocker Box Bush	0·0002 oval
Rocker Shaft Diameter	0·0005 oval
Cam Fingers	0·0008
Valve Guides	Nil

It will be agreed that the above figures are very good indeed, and that the "Cherub III" withstood the very searching test with flying colours.

GENERAL DESCRIPTION

The "Bristol" Cherub engine is of the two-cylinder opposed type, and has a total swept volume of 1,228 c.c.

The bore and stroke are 90 mm. and 96·5 mm. respectively.

Crankshaft.—The crankshaft is a case hardening alloy steel stamping of ample dimensions, carried in four bearings; the crankcase is an aluminium casting, split vertically on the engine centre line, and provided with separate front and rear covers.

Bearings.—There are three main journal bearings. The front one is of the deep groove type, located in the nose of the conical front cover, and transmits the propeller thrust from the crankshaft to the case. The other two are of the double-row self-aligning type, and situated adjacent to the crank throws, one in front and the other behind, and are housed in the front and rear half crankcases respectively. The tail end of the shaft is supported in the rear cover by a plain white metal bearing, which provides an oil seal, allowing oil to be supplied through the hollow tail end and drilled oilways to the big end bearings. On the shaft between the two rear bearings a spur wheel and two spiral gear wheels provide drives for the camshaft, tachometer and magneto and oil pump, respectively.

Connecting Rods.—Connecting rods are alloy steel forgings with hardened liners, pressed into the big ends, the proportions of which are such that the rods may be threaded over the shaft. When in position, the split bronze floating bushes are inserted and the two halves secured to each other by high tensile steel screws which are locked by split pins.

Pistons.—The pistons are of aluminium alloy fitted with three rings, the lower one of which serves as a scraper and returns surplus oil from the cylinder walls through drain holes in the piston skirt. The hollow gudgeon pins float both in the piston bosses and in the connecting rod small ends and are located endways by bronze buttons pressed into their open ends.

Cylinders.—The cylinders have steel barrels, but the inlet

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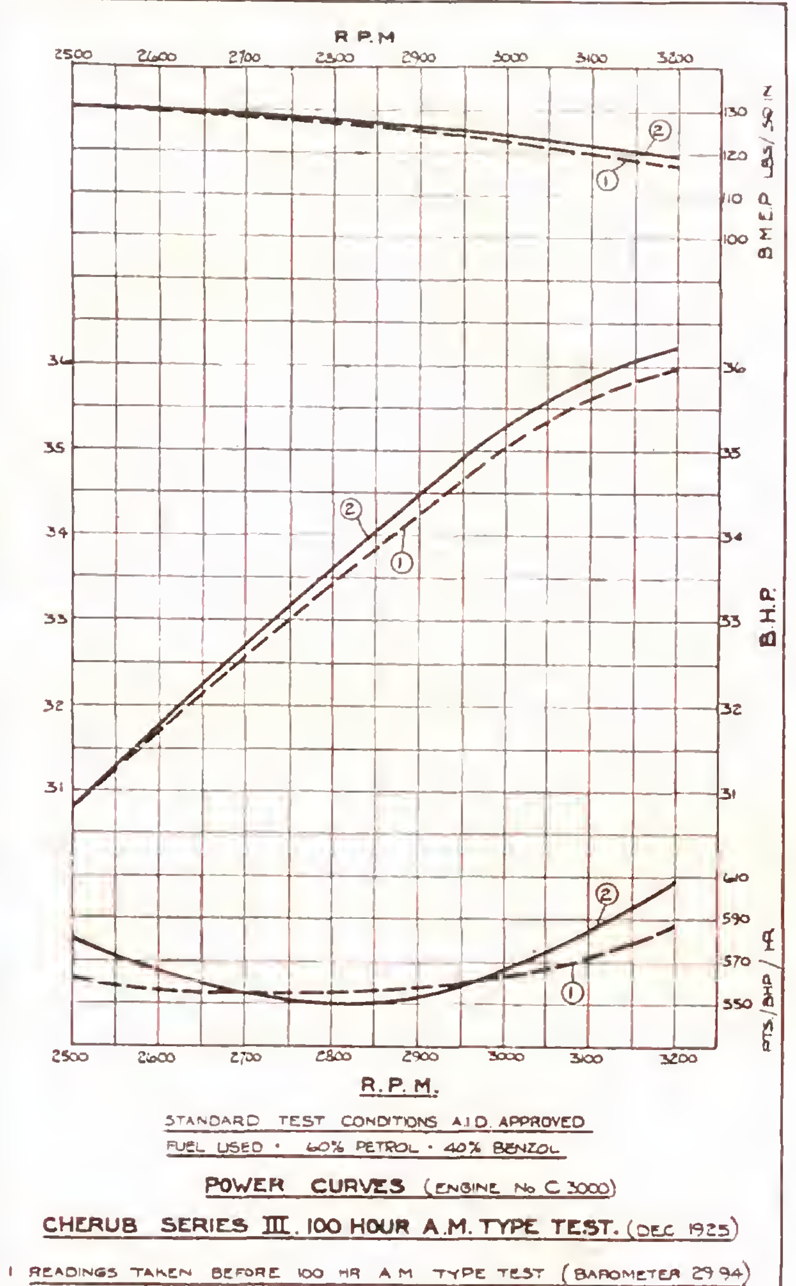


STANDARD TEST CONDITIONS A.I.D. APPROVED
FUEL USED · 60% PETROL · 40% BENZOL
POWER CURVES (ENGINE No C 3000)
CHERUB SERIES III. 100 HOUR A.M. TYPE TEST. (DEC 1925)
1 READINGS TAKEN BEFORE 100 HR A M TYPE TEST (BAROMETER 29·94)
2 READINGS TAKEN AFTER 100 HR. A M TYPE TEST (BAROMETER 29·93)

LEADING PARTICULARS OF THE SERIES III CHERUB ENGINE.

Type: Aircooled horizontally opposed twin.
Cylinders: Aluminium head. Overhead valves.
Bore and Stroke: 3.54″ × 3.80″. 90 m.m. × 96.5 m.m.
Total stroke volume: 75 cu. ins. 1,228 c.cs.
Compression ratio: 5.5 to 1.
Power at normal R.P.M.: 33 B.P.H. at 2,900 R.P.M.
Power at maximum R.P.M.: 36 B.P.H. at 3,200 R.P.M.
Propeller: Direct drive L.H. Tractor.
Lubrication System: Pressure 40 lbs./sq. inch.
Oil Pump: Duplex gear 1 scavenge 1 pressure.
Carburettor: 1 Special Zenith aero model.
Altitude control: Hand operated extra air to diffuser.
Ignition: Dual. Double pole H.T. magneto.
Sparking Plugs: 2 per cylinder, K.L.G. 14 m.m.
Starter Gear: Impulse starter on magneto.
Weight dry: 95 lbs.
Rated consumptions per hour at normal R.P.M.:—
Fuel: 2 gallons.
Oil: 1 pint.

100 HOURS' L TYPE TEST

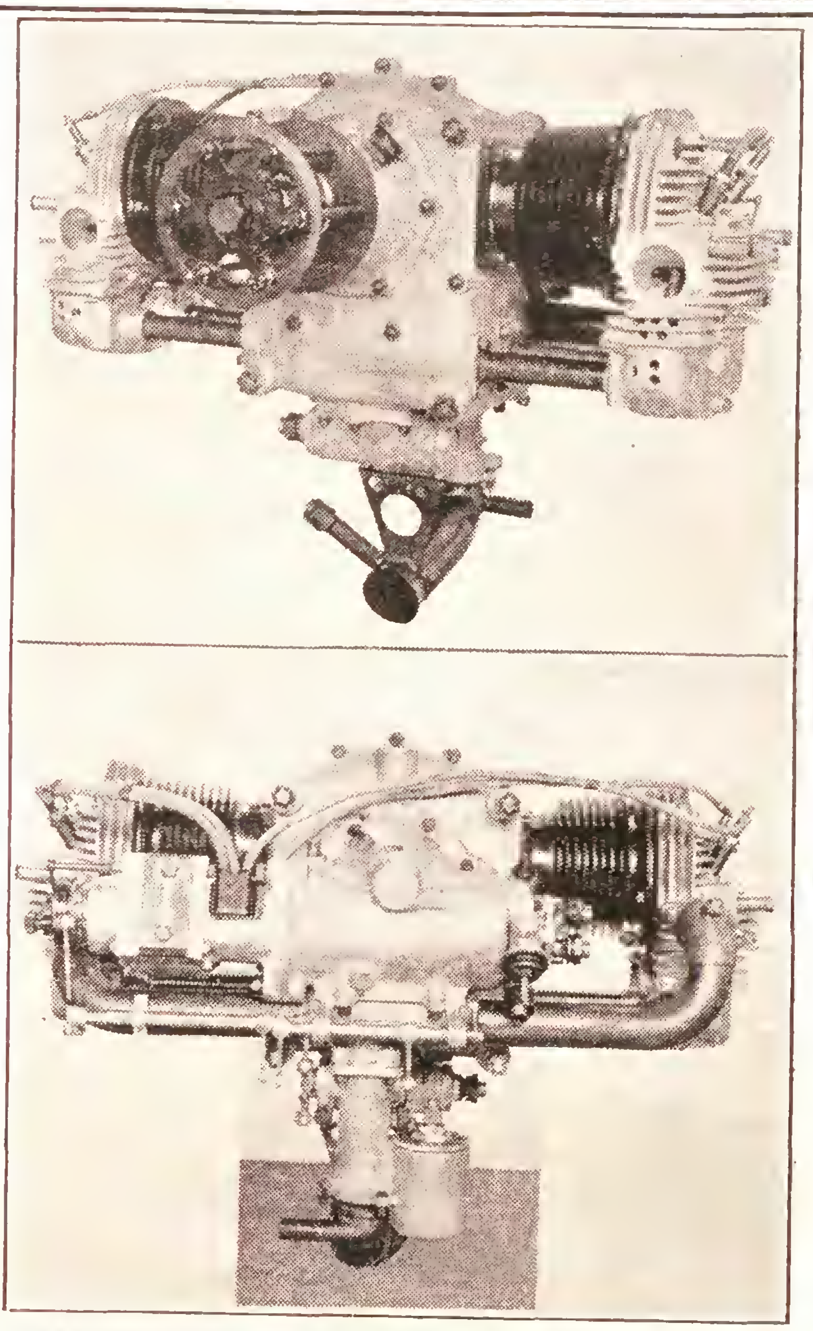
FOR 5 H.P.

CHERUB AED ENGINE

The new Series Iine has completed the British Air hours' Type Test with the highest ten non-stop runs of ten hours eacvithout any hitch, stoppage, adjustmement, and during the last hour thd 36.6 B.H.P. at 3,200 R.P.M.

It will be noticedver recorded after 100 hours' runnin than that shown when the first cur.

At the conclusios the engine was stripped for insphe official report states: "The geon of the engine was excellent."



IMPROVEMENTS EMBODIED IN THE SERIES III CHERUB ENGINE.

1. Bore increased to 90 m.m. and capacity increased to 1,228 c.cs.
2. Amended cylinder head design with new type valves and triple valve springs.
3. Extra gas ring and new design scraper ring.
4. Floating bush big end bearing construction with forced feed lubrication.
5. Dual ignition Watford double pole H.T. magneto and two plugs per cylinder fitted K.L.G. new type 14 m.m.
6. Large capacity ball journal bearings to crankshaft.
7. New design crankcase with dry sump, more robust, smaller and more symmetrical.
8. Pressure feed lubrication by engine driven duplex gear pump, 1 suction 1 pressure unit. Filter embodied in the suction system.
9. Rear of engine modified allowing easier attachment of engine mounting.
10. Special Cherub type Zenith carburettor tucked up more snugly to the engine with new float mechanism. Robust 4-bolt flange attachment.
11. Ignition control automatic, interconnected with throttle. Altitude control interconnected with throttle ensuring automatic return to ground position when throttle is closed.

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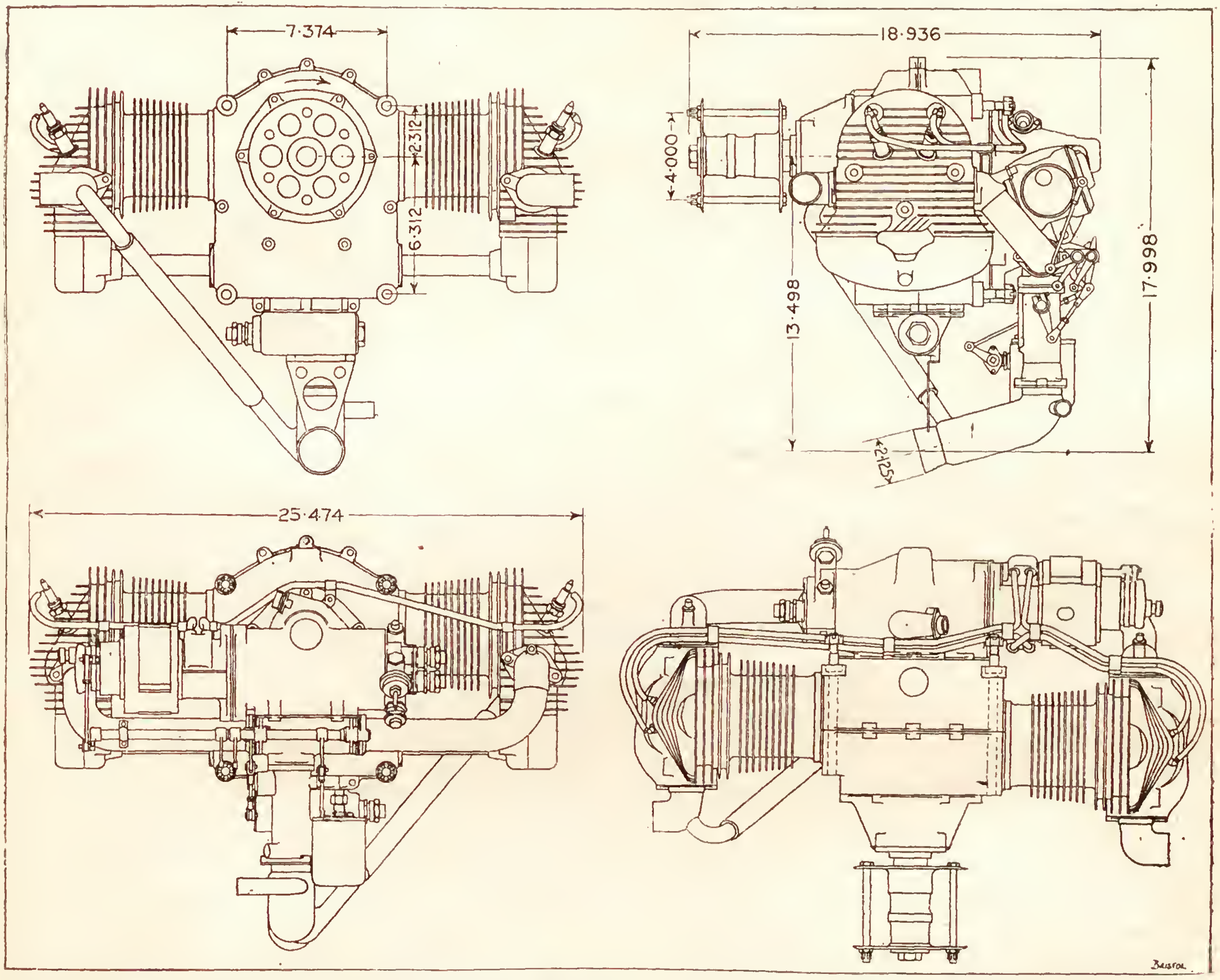
and exhaust passages are formed in the aluminium alloy heads which also carry the screwed-in alloy steel valve seats, valve guides, valves and springs. A deep spigot for the head is provided on the barrel with a flange to which the head is bolted. The spigot protects the vital joint which is formed by a copper ring spigotted and very carefully fitted in annular grooves cut in the head and barrel flanges. As the rates of expansion of aluminium and steel are different great difficulty is usually encountered in the maintenance of a really gastight joint with this type of head. In the Cherub heads, this difficulty has been entirely overcome by inserting packing pieces of a special alloy, having an unusually low rate of expansion between the cylinder heads and the heads of the securing bolts. This arrangement combined with the copper ring joint has proved so satisfactory that the ends of the bolts are riveted over on their nuts, the head and barrel being regarded as one unit which need never be disturbed. The cylinders are secured to the crankcases by a spigotted and flanged joint, a Dermatine ring serving to make the joint oil-tight.



THE BRISTOL "CHERUB," SERIES III : These four views, with main overall dimensions given, should provide sufficient data for designing mountings and cowling for the engine.

Valves.—Inlet and exhaust valves are of cobalt-chrome steel and are interchangeable, and three concentric springs are used on each valve. The valve-operating gear is somewhat unusual, and has distinctive features of considerable importance.

The camshaft which, with its four cams, is machined from the solid, runs across the crankcase below the crankshaft, and is driven by plain spur gears of ample dimensions. The cams are of the constant acceleration type. The valves are operated by rocker shafts which run parallel to the cylinder axes from crankcase to cylinder head. These may be regarded as the precise equivalent of the normal type of rocker arm which is interposed between camshaft and valve in the overhead camshaft type of engine, with the single difference that a rocker which is operated through a finger, by the cams, is separated from that which operates the valves by a length of shafting. As the valve stems project from the cylinder heads radially relative to the cylinder bore, any difference between the expansion of the cylinder and that of the rocker shaft merely moves the valve stem slightly across the face of the operating rocker, but does not alter the valve clearance. A torsion spring fitted to the rocker shaft keeps the cams, finger, and operated rocker in contact, and the whole valve gear is entirely enclosed.

Magneto.—As already mentioned, the magneto is driven by spiral gears from the rear end of the crankshaft. It is mounted on the rear cover by a flange and spigot, and lies behind and parallel to the port side cylinder with the contact-breaker readily accessible. The magneto is a double-pole double-slip-ring type which fires two plugs in each cylinder. It is fitted with an impulse starter to render starting easy.

Lubrication System.—The oil pump is located behind the starboard cylinder in an extension of the magneto housing on the rear cover, where it also is readily accessible, and is driven by the same spiral gears that drive the magneto. It is detachable as a complete unit, and consists of two independent gear pumps. At the bottom of the crankcase is provided a detachable oil sump containing an easily removable oil filter. The larger of the two pumps draws oil drained from the crankcase through this filter, and returns it to the tank *via* a filter in the bulkhead, and supplies it under pressure through drilled oilways to the big-end bearings and the bushed bearings of the camshaft and intermediate wheel. This pump is provided with a spring-loaded pressure adjuster, the by-passed oil being returned to the suction side of the pump. The spiral gears are adequately lubricated by oil collected in a well into which the lower gear dips. The bearings of this gear are automatically lubricated by the oil which flows from a similar but smaller well, special provision being made to prevent leakage through this bearing into the magneto housing. The oil pressure is 40 lb. per sq. in.

Carburettor.—The carburettor is a special type of Zenith, with hand-operated altitude control of the extra diffuser air type and is bolted to a cast aluminium induction T-piece, which is attached by studs and nuts to a broad facing on the underside of the magneto and pump housing on the rear cover. The throttle and magneto advance and retard are inter-connected by a suitable arrangement of levers and links. The altitude control is independent except that it is closed automatically if the throttle is closed. The air intake to the carburettor is an exhaust jacketed steel elbow. The induction pipes run from the T-piece parallel to the cylinders, and are fitted into it with airtight expansion joints, and are provided with bosses to take primer jets.

Mounting.—The engine is mounted from screwed extensions on the ends of the four crankcase bolts at each corner of the crankcase. A standard connection for a tachometer is arranged on the port side above the magneto.

EXPERIMENTAL STRESS ANALYSIS.

THE paper on the above subject, read before the Royal Aeronautical Society on January 7 by Prof. A. J. Sutton Pippard, M.B.E., D.Sc., F.R.Ae.S., was in many ways a most remarkable one, but unfortunately it was of such a technical character as to preclude any possibility of making a useful résumé of it for the benefit of readers of FLIGHT, and we can only advise those interested in the subject to obtain the forthcoming issue of the Royal Aeronautical Society's *Journal*, in which the paper will be published in full.

Prof. Pippard is, of course, an authority on matters pertaining to stress calculations, and it may be recollected that he is the joint author with Mr. J. L. Pritchard of the book "Aeroplane Structures," which has become the recognised text-book on the subject of aeroplane stress calculations in this country.

In his paper Prof. Pippard referred to the report of the Accidents Investigation Sub-Committee of the Aeronautical Research Committee, and quoted from this report the following passage: "The existing methods of calculation at present in use for determining the scantlings of structural members of an airship are insufficiently accurate for the purpose, and more exact methods should be developed."

The lecturer then briefly recalled the formation of the Airship Stressing Panel, under the Chairmanship of Mr. R. V. Southwell, and the published report of the Aeronautical Research Committee (R. & M. 800) containing certain results of the work of the Airship Stressing Panel. He pointed out that these results were only obtained by the introduction into the analysis of various simplifying assumptions, the validity of which required checking. The Panel recommended that experiments should be initiated on models representative of the structure of a rigid airship, as a check on the theoretical results of their report.

At the end of 1923, Prof. Pippard, who was then in a position to undertake experimental work, suggested to the Aeronautical Research Committee that he should carry out a research into the properties of redundantly braced frameworks. This course was agreed to, and the experimental work was begun almost immediately, and has proceeded continuously up to the present date at Cardiff University College. It was with the results of these experiments that Prof. Pippard's paper dealt.

Prof. Pippard then referred briefly to a series of investigations commenced by Mr. Southwell, inspired by the problems of the torsional stresses in an aeroplane fuselage, and gave an outline of this work.

The lecturer then showed slides illustrating the model used by him in his experiments, which was a framework three bays in length, each bay being 30 in. long. In section the framework was hexagonal, the side of the hexagon being 25 in. As the theoretical analysis had been based on the assumption that the structure was pin-jointed throughout, an attempt was made to design a suitable joint of this type. It may be imagined that to design a frictionless joint in which there should be no fixing factors would have been well-nigh impossible, and ultimately a suggestion made by Mr. Southwell that the members of the structure should be attached to the joints by short dowels or pins was adopted. Preliminary tests on these joints indicated that the dowels might be relied upon to serve as a satisfactory means of attachment without introducing any serious fixing effect.

Accurate means for measuring the stress in all the members of the structure were essential, and for this purpose none of the standard types of extensometers were suitable, and consequently a special instrument had to be designed, and this was done in collaboration with the Cambridge Instrument Co., Ltd. The result was a micrometer microscope which gave the high degree of accuracy required.

A series of experiments on the stresses in various members in this structure under various loads was then described, but space does not permit of referring to these in detail, and all that is possible here is to give the general conclusions arrived at by Prof. Pippard, which were as follows:—

"1. When a tubular framework with redundant bracing is provided with efficient bracing in the plane of the applied load system, the stresses in the members tend quickly to become independent of the arrangement of the load system.

"2. The provision of additional bracing in other planes parallel to that of loading produces a much quicker equalisation of stresses.

"3. Unless efficient bracing is provided in the plane of loading to act as an initial distributor of the external load, even if the tube exhibits a high degree of redundancy in other planes, the process of equalisation is a very slow one, and the stresses even at a distance from the plane of loading would be dependent to a considerable extent upon the arrangement of the load system.

"4. If in the design of such structure (*e.g.*, the hull of a rigid airship) formulæ are used which determine the stresses in the members in terms only of the resultant actions at the section considered, it is important that effective bracing should be provided in the plane of the load system. Unless this is done there is a very serious liability of error."

Effect of Non-operating Members

In conclusion the lecturer dealt with the case when certain members of a framework are capable of resisting compression only up to a definite value, such as slender struts in which the load will increase as the external load is increased until its magnitude reaches the Euler critical value, after which it will bow, and the load remain constant at the critical value. In the case of an initially tensioned wire, the member behaves as a strut until the induced compression just balances the initial tension. It then ceases to function and is no longer an integral part of the framework.

"A framework containing such members," the lecturer said, "presents difficult problems, since all members are operative under small external loads and the structure may exhibit a high degree of redundancy: under large external loads it may reduce to a simply stiff frame, while intermediate loads may produce any degree of redundancy between these extremes."

For practical stress analysis, it was generally sufficient to take account of the two extreme cases, but in the design of rigid airship hulls the work involved was prohibitive. Approximate methods had been given by the Airship Stressing Panel in R. & M. 800, but while this analysis was legitimate for normal flight conditions of loading, some or all of the counterbracing panel wires resisting compression might become inoperative under exceptional loads. It was essential that the stresses in the frame under the extreme loading conditions should be known. A method had been suggested by Mr. Southwell by which such stresses could be simply deduced from a knowledge of the stresses in the various members of the framework in its normal fully redundant state. To apply this method it was necessary to calculate the loads in all members of the framework under the extreme conditions, assuming it to be fully redundant and all members capable of resisting compression of any required amount. In order to obtain such conditions, external forces were imagined to be applied to the joints connected by the members, of such magnitude as to reduce the hypothetical stresses in them to the actual values. An example was given in which reversed loads were superposed on the panel, and it was pointed out that if this superposition were made for each panel in a framework and the complete structure analysed under such superimposed loads, an exact solution of the problem would be obtained, but the work would be heavy. It was therefore suggested that each panel should be treated as if it were an independent frame. If this were done the work was very easy, but it necessitated an assumption that required check to determine the degree of approximation involved. During his experiments Professor Pippard made a check of this point, and the check showed that the general agreement was good. It was therefore concluded that the method described was sufficiently reliable to give a good indication of the stresses in the extreme condition when redundant members had ceased to operate. Finally Professor Pippard referred to some experimental work now in progress, in which the longitudinal members of the model structure were continuous instead of being pin-jointed at the transverse frames.

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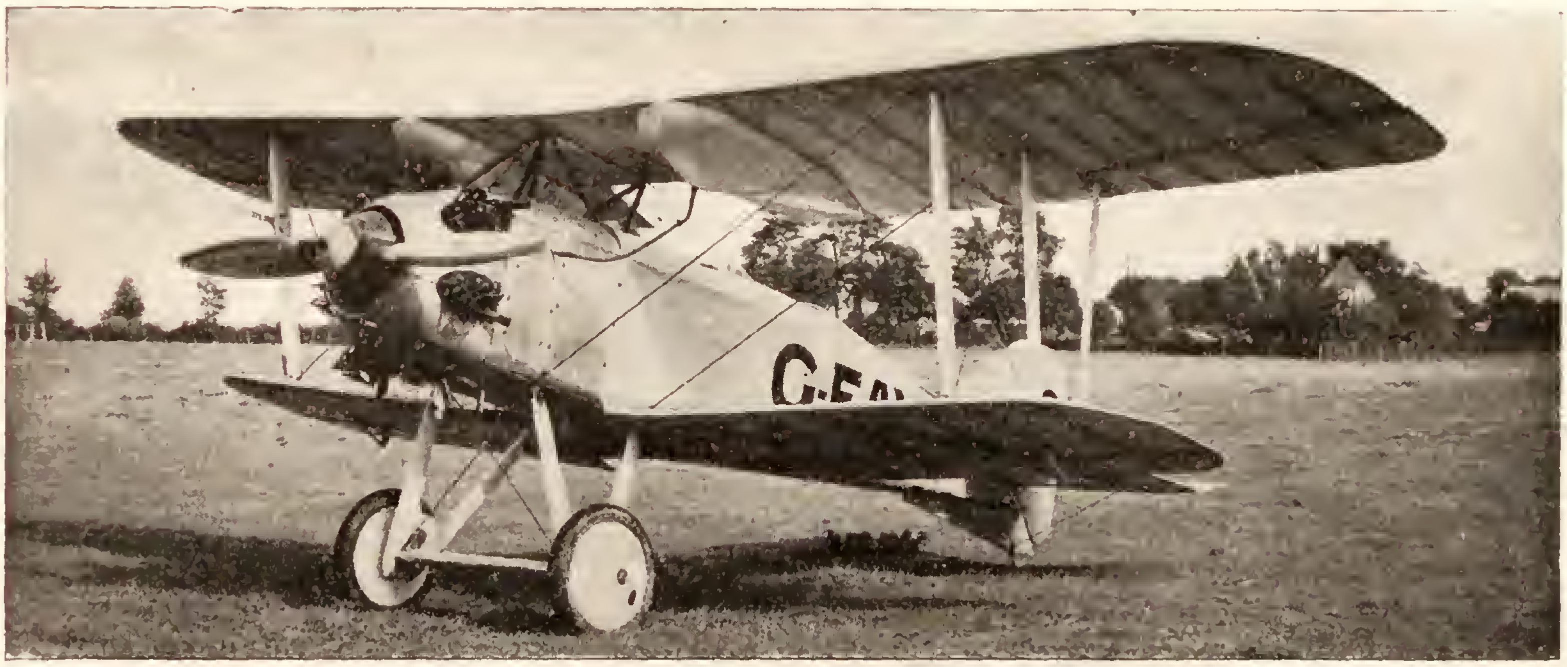

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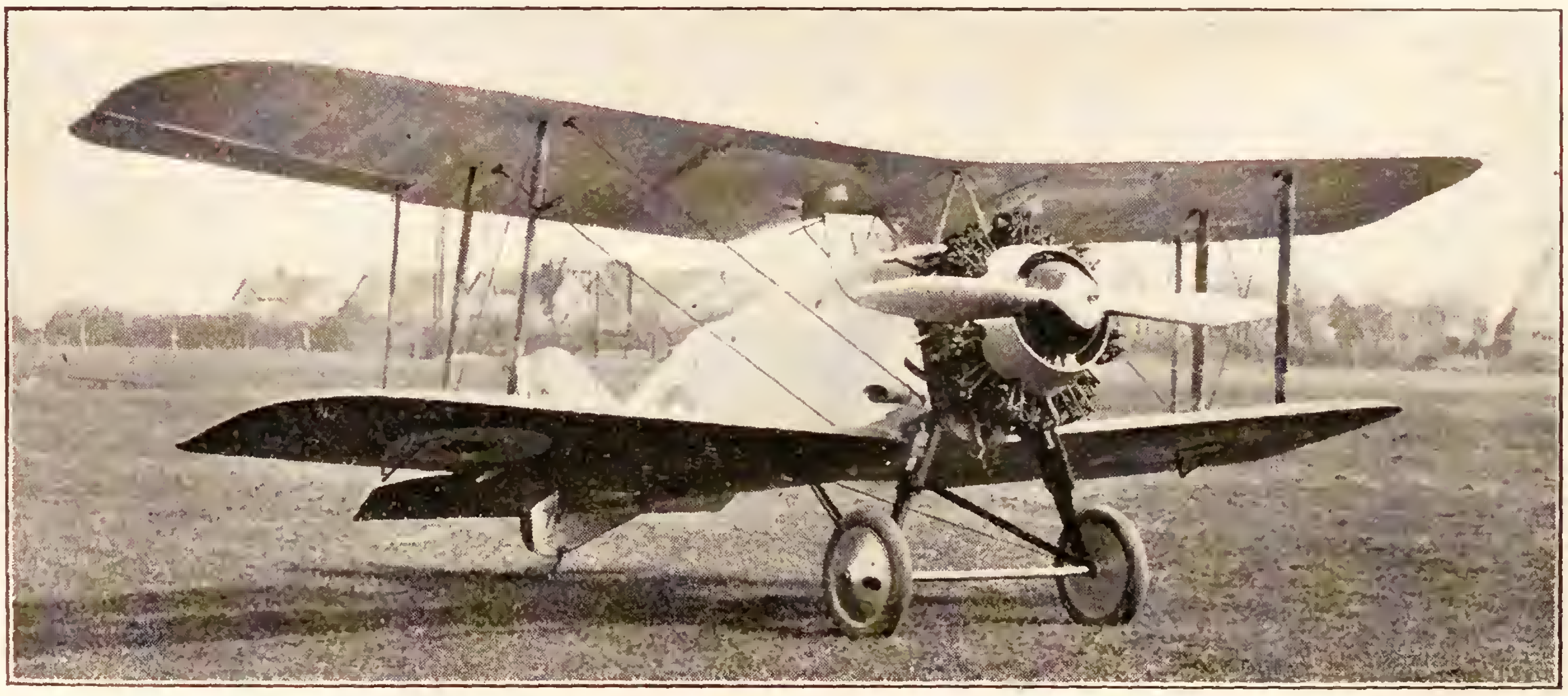

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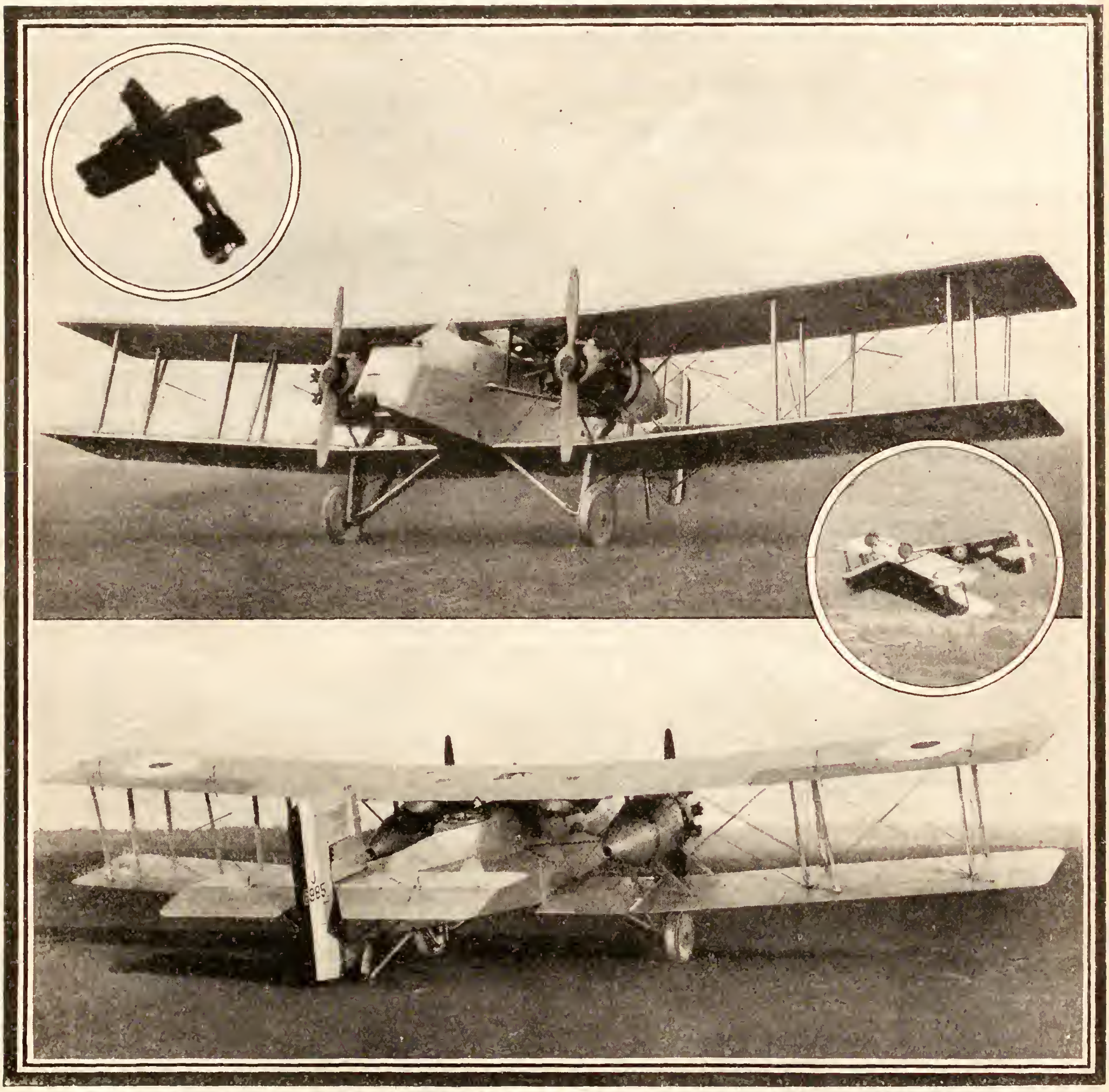

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AIR LINES IN SOUTH RUSSIA

The following particulars of the air lines operated in South Russia by the "Ukrvozduchput" Co. (the Ukraine Air Transport Co.) during 1925, published in a recent issue of the "Soviet Press," may be of interest.

The "Ukrvozduchput" Co. opened its first air line, between Kharkov and Kiev, on April 15, 1925, and by June 15 was regularly operating air lines over some 2,000 kms. (1,240 miles), connecting Kharkov with Moskva (Moscow), Kiev, Odessa, and Rostov-on-Don. During that time and up to July 15 the company had only five aeroplanes and four spare engines.

During the summer regular services were operated, three times a week, on two lines:—

(1) Moskva—Kharkov—Rostov-on-Don.

(2) Kiev—Kharkov—Odessa.

The first route, which includes a total distance of about 1,070 kms. (663·5 miles), is divided into the following main stages: Moskva—Orel (aerodrome), 320 kms. (198·4 miles); Orel—Kharkov, 350 kms. (217 miles); Kharkov—Artemovsk (aerodrome), 205 kms. (127 miles); and Artemovsk—Rostov-on-Don, 195 kms. (121 miles). In between are the following control stations or intermediate halts: Alexin (Tula), Malo Archangelsk, Kursk and Oboyan. This route was operated as follows: machines left Moskva at 6.30 a.m. and arrived at Kharkov at 11.50 a.m. and at Rostov-on-Don at 4.20 p.m., three stops being made at Orel, Kharkov and Artemovsk. As the stops at these places amounted to about 2 hours, the total distance of 1,070 kms. (663·5 miles) was thus covered in 8 hours, or at an average speed of 135 kms.p.h. (83·7 m.p.h.).

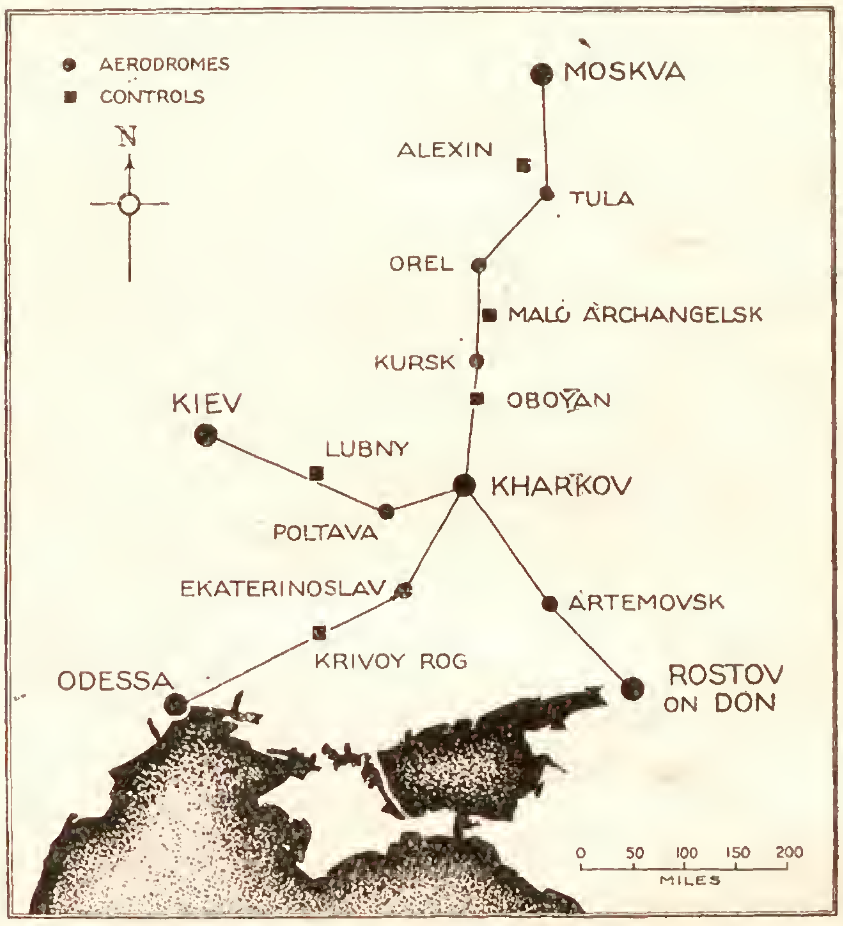
The second route, Kiev—Odessa, of 1,020 kms. (632·4 miles), which, as may be gathered from the accompanying sketch map, more or less doubles back on itself, is divided into the following main stages: Kiev—Poltava (aerodrome), 310 kms. (192 miles); Poltava—Kharkov, 120 kms. (74·4 miles); Kharkov—Ekaterinoslav (aerodrome), 200 kms. (124 miles); and Ekaterinoslav—Odessa, 390 kms. (241·8 miles). Control stations are located at Lubny and Krivoy Rog.

On the second route machines left Kiev at 7.45 a.m. and reached Odessa at 6.15 p.m., stops having been made at Poltava, Kharkov and Ekaterinoslav, and the actual flying time being 9½ hours.

An efficient meteorological service was organised in connection with these lines, reports being obtained daily from the Kiev Central Meteorological Office, from Moskva, and other stations along the routes, where pilot balloon ascents were carried out.

At present the "Ukrvozduchput" company's air fleet consists of six Dornier "Komet III" high-wing monoplanes and 13 Rolls-Royce "Eagle VIIIa" engines. An additional Dornier "Komet III" was ordered towards the end of last year, and has probably been delivered by now, while the "Krasny Letchik" factory is shortly to supply Soviet-constructed aeroplanes fitted with 100 h.p. Bristol "Lucifer" engines.

In conclusion it may be noted that the flying personnel of the "Ukrvozduchput" company is all highly qualified.



AIR LINES IN SOUTH RUSSIA: Sketch map showing the air routes operated during 1925.

Minor repairs are effected at the workshops at Kharkov, and big repairs are carried out at Moskva under the supervision of Mr. Holt, a representative of the Rolls-Royce firm and a member of the "Deruluft" staff.

The use made of these air services had been very satisfactory, so much so that in the near future the services will be operated daily and a more intensive use made of the aircraft and flying personnel.

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London-Cape Town Survey Flight

Mr. Alan Cobham has been delayed at Mongalla, waiting for supplies, but during the wait the party enjoyed some good big-game shooting. The journey was resumed on January 10, and they arrived safely at Jinja, 4,890 miles from home.

Master of Sempill Flies Home from Ireland

After waiting for some days at Belfast for better weather conditions, Col. the Master of Sempill, started off on his return flight to Stag Lane, in the D.H. "Moth" light aeroplane (60 h.p. A.D.C. "Cirrus"), on January 5. During the trip across the Irish Channel to Stranraer, he encountered dense fog, and experienced great difficulty in locating the aerodrome at Stranraer, owing to bad visibility, having to make a circuit *via* the Mull of Galloway before he eventually landed. Although conditions were still bad, he decided to continue on to London, but by the time he arrived over Kirkcudbright the fog was so dense he was forced to return to Stranraer, and await better conditions. Matters had not improved very much the next day, when he set out, at 10.30 a.m., once again from Stranraer, visibility being poor, and there was a strong head wind. He had to fly at about 1,500 ft. when crossing the Solway Firth, in order to keep above the clouds. As a result, he steered a little too far inland when over the Lake District, and had to make a detour through a valley so as to strike the correct course along the shore again. This accomplished, he flew at an altitude of about 30 ft. along the borderland of sea and shore to Morecambe Bay, *via* Barrow, and thus escaped the full force of the wind. At Southport, he landed on an island sandbank—in order to avoid a crowd of well-meaning "helpers"—and replenished the tanks with petrol from the spare supply he carried with him, and then took off once again. Another halt was made at the Sealand Aerodrome at Shotwick for fuel, after which he continued, through rain squalls, as far as High Wycombe. Here it was necessary to land in a convenient field to fill up again with petrol (from spare cans), and then he completed the last stage to Stag Lane without further incident, landing at 4.30 p.m.

Japanese Airmen Home

Maj. Abe and Mr. Kawachi, the Japanese airmen who accomplished a successful flight from Tokyo to Europe last year, arrived back in Tokyo on January 10, and received an extraordinarily enthusiastic welcome.

An Aero Club for Dublin

Following on the recent visit to Ireland of Sir Sefton Brancker, the first Free State aeroplane club has just been formed in Dublin. A temporary committee has been formed, and the Governor-General has signified his intention of supporting the Club.

Imperial Air Routes

Squad.-Leader. A. Coningham, leader of the recent R.A.F. flight from Cairo to Kano and back, has been sent to Nairobi to attend a conference of the Governors of Kenya Colony, Tanganyika, and Uganda, on the subject of African air routes, especially from Kisumu to Khartoum. A second official survey party is also being sent along the 2,500-mile air route between Cairo and Karachi with the object of consolidating the work of the previous expedition.

Personals

Married

Air Vice-Marshal Henry Robert Moore Brooke-Popham, C.B., C.M.G., D.S.O., Principal of the Royal Air Force Staff College, at Andover, and only son of the late Mr. Henry Brooke, of Wetheringsett, Suffolk, was married at All Saints Parish Church, Ledsham, near Castleford, Yorkshire, on January 5, to Miss Opal Mary Hugonin, niece of Sir Granville Wheeler, M.P., and Lady Wheeler, of Ledston Hall, and younger daughter of Mr. Edgar Hugonin and the late Mrs. Hugonin. Air-Commodore Veset Holt, C.M.G., D.S.O., was best man, and there was a reception at Ledston Hall.

Flight-Lieut. A. G. Bond, A.F.C., R.A.F., eldest son of the late A. J. Bond and Mrs. Bond, of Walford, Herefordshire, was married on January 8, at St. James's Church, Piccadilly, to Hylda Olive Pales, daughter of Mr. and Mrs. W. Pales, of Alexandra Park.

On January 2, at St. John the Evangelist, Penge, Ernest Ronald Henshaw Coombes, R.A.F., was married to Gwendolen Eileen Mary, youngest daughter of Mr. and Mrs. John E. Webster, of 18, Queen Adelaide Road, Penge.

Herbert Cyril, Flying Officer R.A.F., Hawkinge, Kent, eldest surviving son of Mr. and Mrs. H. R. Lee, of Longdon, Wellington, was married on January 6, at St. Chrysostom's Church, Victoria Park, Manchester, to Edith Maud, only daughter of Mr. and Mrs. Charles R. Millar, of Manchester.

The marriage arranged between Flight-Lieut. C. E. V. Porter, R.A.F., and Mrs. C. C. Denison took place quietly in London on Thursday, December 17.

To be Married

The marriage between Mr. Douglas Field, R.A.F., and Miss Joan Ashwin will take place at St. Mary-le-Strand at 2.15 on the 16th inst.

The engagement is announced between A. H. H. MacDonald, R.A.F., son of the late Capt. A. MacDonald and of the Comtesse de Preux, and Barbara, elder daughter of Lieut.-Col. and Mrs. Worsley-Gough, of 3, Buckingham Gate, S.W., and The Thatched Cottage, Pangbourne, Berks.

The engagement is announced between Mervyn Minter (late Capt. R.F.C. and R.A.F.), son of Mr. and Mrs. A. R. Minter, of Sydney, and Dorothy, elder daughter of Mr. and Mrs. F. Bushby Wilkinson, of Sydney, N.S.W.

* * *

Royal Air Force and the Royal Aero Club

It is now some considerable time ago that the Royal Aero Club decided to offer to R.A.F. officers special facilities for becoming members of the Royal Aero Club, and the subscription fee was consequently reduced to half in their case. In spite of this fact, it is to be regretted that the support given to the Royal Aero Club by R.A.F. officers is far from being as great as might have been expected, and especially does there appear to be a scarcity of senior officers of the R.A.F. In view of the valuable work which the R.Ae.C. is doing, not only in its main sphere of organising races and competitions, but in many other directions, one might have expected the R.A.F. to show to a much greater extent its appreciation of the good work done by the Royal Aero Club. It should not be overlooked that the Club has done, and is doing, a very great deal of charitable work, most of which is to the direct benefit of officers serving in the R.A.F. Thus, we may mention that on the outbreak of war, the Royal Aero Club raised a fund to assist dependants of officers killed in the war, and already something like £20,000 has been distributed. Monthly grants to 30 families are being paid out for the purpose of contributing to the education of quite a large number of children of officers and ratings of the R.A.F., who were left unprovided for.

In addition, the Royal Aero Club, through its energetic Secretary, Commander H. E. Perrin, takes an active interest in other charities connected with the R.A.F. and other services. For instance, Commander Perrin represents the Royal Air Force on the Council and Executive of the Officers' Association, British Legion, and Officers' Benevolent Department, and he is on the Advisory Council of Lord Haig's Services Fund. He is also on the Executive of the Royal Air Force Memorial Fund, and is Chairman of the Grants Committee of that Fund. We are quite sure that the comparatively scant support, in the form of memberships, by the R.A.F. in general is only due to a lack of appreciation of all the Royal Aero Club is doing, and that once this has been pointed out to officers of the R.A.F. and R.A.F. Reserve, there will be many who will instantly come forward, especially as the subscription fee in their case if but £3 3s.

Economy—and Airships

In order to secure economy, the Government has made a drastic curtailment of the original airship programme, with the result, it would seem, that once again progress in the development of the lighter-than-air side of aeronautics in this country will be held in check. In addition to the decision not to proceed with the reconditioning of R.36 further experimental flying with R.33 has been suspended. Pulham has been reduced to a "care and maintenance" station, and members of the crew of R.33 have received notices of discharge (essential members of the crew are being retained). Cardington station is also feeling the axe, while it is rumoured that work on the new "five-million" rigid, R.101, will be spread over a longer period than was originally intended. So let us have that "light airship club."

The Next Schneider Cup Contest

At a meeting of the General Committee of the International Federation of Aeronautics, held in Paris, on January 11, at which Mr. Lahm (U.S.A.) presided, and 14 nations were represented, it was decided that the regulations of the Schneider Cup Contest should not be modified for the next race. It was proposed by France that competing machines should carry a deadweight of 250 kgs. (550 lb.), in addition to pilot and fuel. Italy also made a similar proposal, the weight proposed being 400 kgs. (882 lb.), and further suggested that each machine should be capable of a minimum speed of 113 k.p.h. (70 m.p.h.). Both the British and the American representatives opposed these proposals, which were rejected. It is not yet decided whether the next contest will be held this year (October 24) at Hampton Roads, as fixed by the American authorities, and efforts are being made to get the contest postponed until next year.

An Australian-New Zealand Flight ?

The Australian airman, Mr. Kingsford Smith, has applied to Mr. Bruce, the Prime Minister, for assistance for a flight in the Widgeon flying boat from Australia to New Zealand.

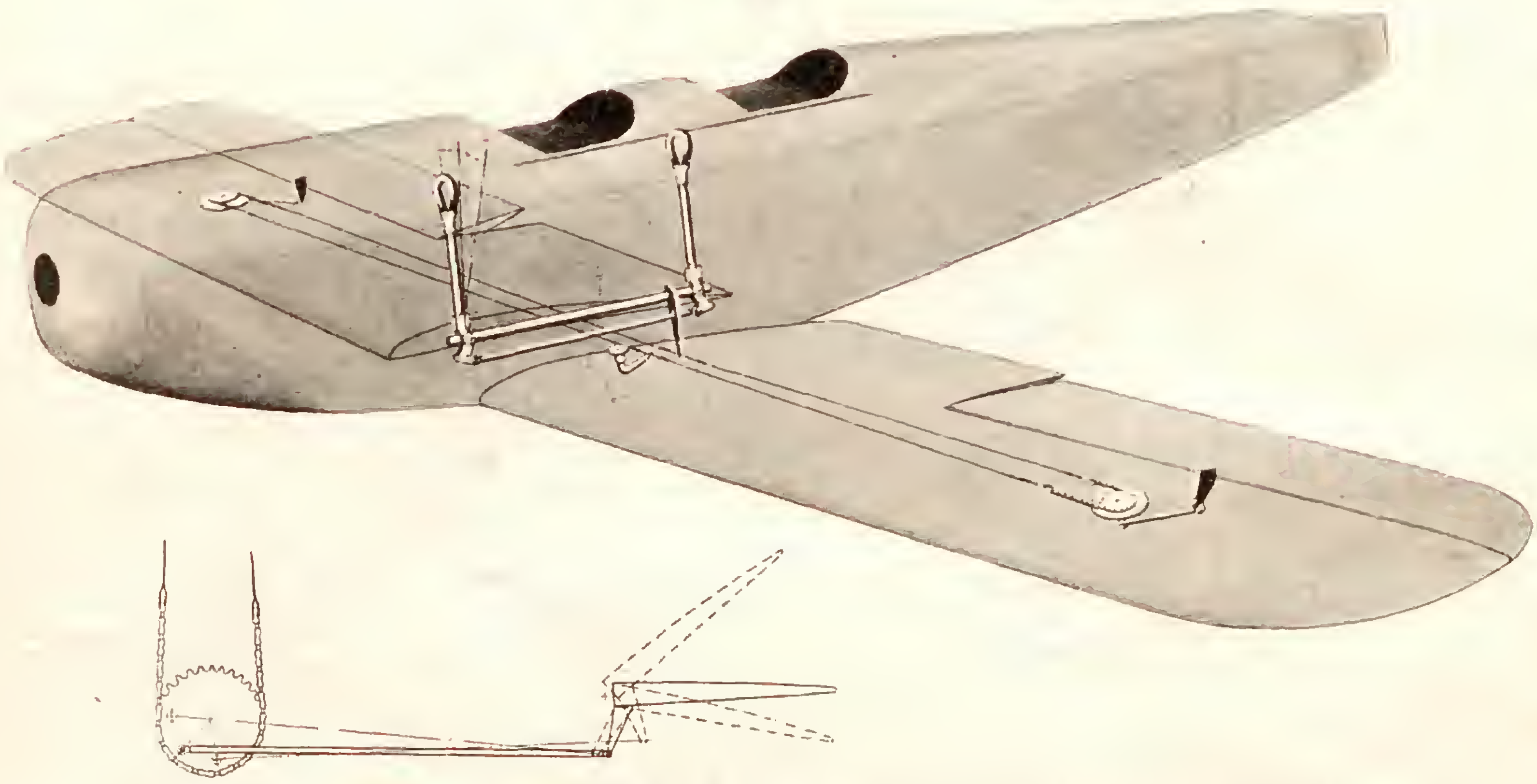
Fokkers in America

According to a message from Detroit, Mich., the Continental Motors Corporation, which company supplies the well-known Red Seal motors to numerous American motor-car manufacturers, has placed an order with the Fokker Aircraft Co. for a type F. VII-3m., three-engined monoplane, for use in connection with their business. The plants of this company being spread over the State of Michigan, the communication between the various factories was most unsatisfactory, due to the loss of time and enormous expenses. In order definitely to eliminate these drawbacks, they decided to purchase an aeroplane, and induced by the brilliant results recently obtained with the three-engined Fokker Monoplane, this machine was chosen. It is intended to use the machine chiefly for the transport of the staff in charge of the regular inspection of the company's factories. In the opinion of the Continental Motors Corporation, this purchase will mean the following advantages: Decrease of the number of high-salaried superintendents; as a consequence, considerable decrease of the enormous travelling expenses; simplification of the inspection because all inspection matters can now be dealt with by the same persons; and last, but not least, means of speedy transportation in urgent cases.

As a result of the campaign for better and regular civil aviation in the United States, several air lines, backed by the big American industries, have lately been opened. Especially for long distances, these air services prove to meet a long-felt necessity. A little while back a new air line, New York-Cuba, *via* Florida-Key West, was opened, on which a three-engined Fokker F. VII-3m has been put into service. On the occasion of the first flight of this machine on the approximately 2,500 miles long route, 90 miles of which are flown over the ocean, Mr. Fokker himself was one of the passengers.

This announcement is the second of a series dealing with

DESIGN & CONSTRUCTIONAL FEATURES OF DH AIRCRAFT.



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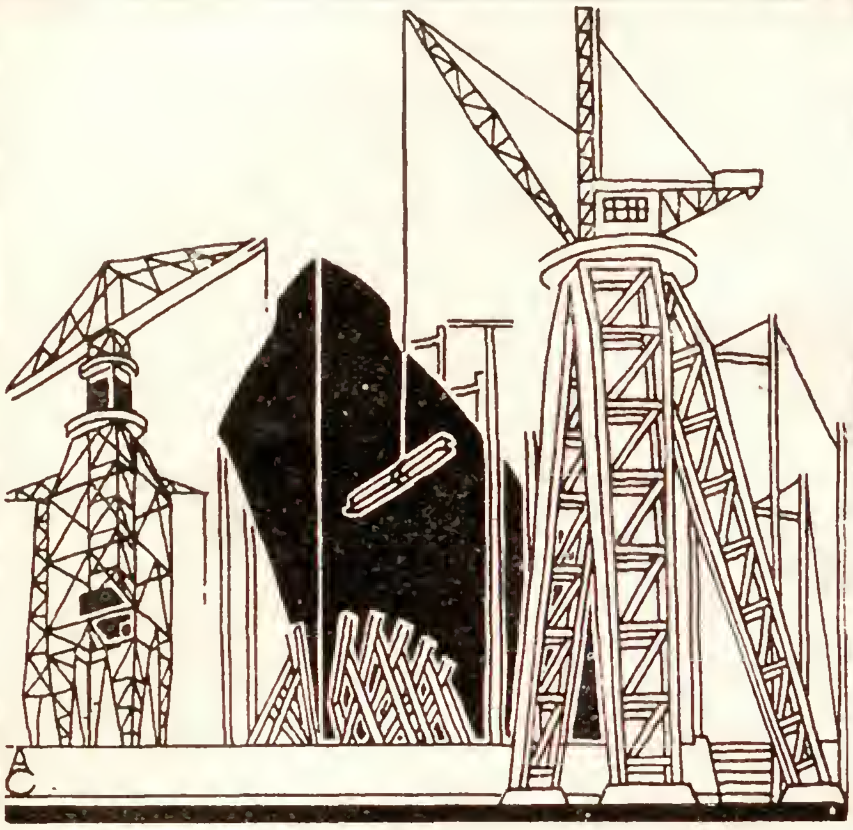

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THE ROYAL AIR FORCE

London Gazette, January 5, 1925.

General Duties Branch

Pilot Officer H. R. F. Baxter is promoted to rank of Flying Officer (June 19, 1925); Observer Officer W. H. Dunton is placed on retired list on account of ill-health (Jan. 6); Pilot Officer H. W. P. Stewart is transferred to Reserve, Class A (Dec. 23, 1925); Flying Officer B. P. Jones is transferred to Reserve, Class C (Jan. 4); Pilot Officer on probation E. G. Rosling relinquishes his short-service commission on account of ill-health (Jan. 2); Flight-Lieut. W. J. Dew, M.B.E. (Capt., Queen's Royal Regt.), relinquishes his temporary commission on retirement from the Army (Jan. 1).

Stores Branch

Pilot Officer B. W. Hemsley is confirmed in his appointment, and is promoted to rank of Flying Officer (Nov. 25, 1925).

Reserve of Air Force Officers

Squadron Leader H. R. Raikes, A.F.C., is promoted to the rank of Wing Commander (Jan. 1). The follg. are confirmed in rank (Dec. 30, 1925):—Flying Officer H. Lawson, Pilot Officer A. Prescott. Flying Officer C. B. M. Dale is transferred from Class C to Class B (Dec. 5, 1925); Flying Officer H. Soulsby resigns his commission (Dec. 23, 1925). The commission of Pilot Officer on probation J. F. O. Coleman is terminated on cessation of duty (Dec. 19, 1925).

Princess Mary's R.A.F. Nursing Service

Staff Nurse Miss G. R. Jones is placed on the retired list on account of ill-health (Dec. 31, 1925).

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified :—

General Duties Branch

Group Captain.—R. C. M. Pink, C.B.E., to R.A.F. Depot, pending disposal on transfer to Home Estab. 15.12.25.

Wing Commanders.—A. S. Barrett, C.M.G., M.C., to School of Army Co-operation, Old Sarum, pending taking over command, 14.1.26. W. L. Welsh, D.S.C., A.F.C., to Station H.Q., Kenley, to command, 11.1.26. S. W. Smith, O.B.E., to H.Q., Cranwell, for Administrative duties, 21.1.26.

Squadron Leaders.—M. Henderson, D.S.O., to R.A.F. Depot, on transfer to Home Estab., 20.12.25. H. A. Tweedie, O.B.E., A.F.C., to R.A.F. Depot, 1.1.26. H. M. Probyn, D.S.O., to R.A.F. Depot, on transfer to Home Estab., 20.12.25. W. B. Farrington, D.S.O., to R.A.F. Depot, on transfer to Home Estab., 18.12.25.

Flight Lieutenants.—A. Chapman, to Inland Area Aircraft Depot, Henlow, 19.1.26. E. J. Cuckney, D.S.C., to Sch. of Tech. Training (Men), Manston, 8.1.26. F. J. W. Mellersh, A.F.C., to Central Flying Sch., Upavon, on transfer to Home Estab., 12.1.26. W. T. S. Williams, D.S.C., to remain at R.A.F. Depot, instead of to School of Tech. Training (Men), as previously notified. H. E. Searson, D.F.C., to No. 4 Sqdn., S. Farnborough, 15.1.26. P. E. Maitland, A.F.C., to R.A.F., Base, Calshot, 24.1.26.

Flying Officers.—J. G. Murray, to R.A.F. Station, Donibristle, 8.1.26. G. N. P. Stringer, to No. 39 Sqdn., Spittlegate, 11.1.26. F. B. Robinson, to R.A.F. Depot, 11.1.26. O. R. Pigott, to No. 2 Flying Training Sch., Digby, 14.1.26. J. B. Townend, to Record Office, Ruislip, 19.1.26. W. C. Adams, to R.A.F. Depot, on transfer to Home Estab., 5.12.25.

Medical Branch

Wing Commander.—J. MacGregor, M.C., M.D., to R.A.F. Hospital, Halton, to command, 7.1.26.

Flying Lieutenant.—A. E. Barr-Sim, M.B., to Superintendent, R.A.F. Reserve, Northolt, 30.1.26.

Flying Officer.—D. B. Smith, M.B., to Elec. and Wireless School, Flowerdown, 11.1.26.

NAVAL APPOINTMENTS

The following appointments were made by the Admiralty on Jan. 4 :

Lieuts., R.N. (Flying Officers, R.A.F.).—H. M. S. Forbes, D.S.C., and C. R. Townsend, to R.A.F., Training Base, Leuchars (Jan. 4).

* * *

London Air Defence Appointment

The following appointment is announced by the War Office :—

Col. A. F. Thomson, D.S.O., to command the 26th London Air Defence Brigade, T.A., in succession to Col. D. H. Gill, C.M.G., D.S.O. (June 18).

R.A.F. Apprentices at Halton

On January 7 the 1923 entry of aircraft apprentices at Halton were inspected and passed out by Air Vice-Marshal Sir Philip Game, who also inspected the school. The Commandant, Air Vice-Marshal C. L. Lambe, said that that entry was the third to complete the course at Halton, and of the apprentices originally enlisted, 40 were passed to Flower Down for training as wireless operator mechanics and 27 had been transferred to other entries. Those passing out had been trained as aero engine fitters, carpenters, riggers, coppersmiths, turners, carpenter motor-body builders, and button makers. The following were the results of the final examination :—Aircraft apprentices classified leading aircraftsmen, 64 ; classified A.C.1, 223 ; classified A.C.2, 98 ; failed, 9 ; not examined owing to sickness, 2. The following awards were made :—Cadetships, 6 ; aircraft apprentices recommended for corporal's advanced course, 8. The educational standard was about equal to that of previous entries, and the standard of manual dexterity had been fully maintained.

The Royal Air Force Memorial Fund

The usual meeting of the Grants Sub-Committee of the Fund was held at Iddesleigh House, on January 7. Lieut.-Commander H. E. Perrin was in the chair, and the other members of the committee present were : Mrs. L. M. K. Pratt-Barlow, O.B.E., Sqdn.-Ldr. E. B. Beauman. The committee considered in all 15 cases, and made grants to the amount of £108 1*s.* 8*d.* The next meeting was fixed for January 21, at 2.30 p.m.

Anti-Air Police

Bodies of volunteer police are now being raised in Kent, Sussex, and Essex in connection with a scheme for the defence of London against aircraft. The men are being enrolled by the chief constables of the counties and they will be trained to undertake ground observation work of the movements of aircraft at various points.

R.Ae.C. Monthly House Dinner

The Third Monthly House Dinner will be held at the Royal Aero Club on Wednesday, January 20, at 7.30 p.m. The subject for discussion will be "The Auxiliary Air Force," and the debate will be opened by the Chairman, Lord Edward Grosvenor. Members wishing to attend are requested to send in their names at once to the Secretary as the number is limited to sixty. Dinner 5*s.* Morning dress. The subject for the February Monthly Dinner will be "Private Flying." The date will be announced later.

The New German Air Transport Co.

The formal amalgamation of the two German air transport concerns, the Aero-Lloyd and the Junkers' Air Transport Co., was concluded on January 6 with the formation of a provisional organising company, under the name of Deutsche Lufthansa, with Herr Merkel and Herr Wronsky (Aero Lloyd), and Herr Milch (Junkers) on the executive board.

German Night-Flying Services

The night air mail service, on the Berlin-Hamburg route, which was in operation from July 1 to October 1, 1925, has during these three months transported more than ten tons of mails, newspapers and goods, and 93 per cent. of the scheduled flights were carried out. In July and August the figure was increased to 100 per cent., as not one flight was omitted. The experimental night service operated by the Junkers Company between Copenhagen and Warnemunde was suspended on November 30 last, having been in operation for 2½ months. This service will, it is expected, be resumed next spring.

High Efficiency on Rotterdam-Copenhagen Service

The figures for the K.L.M. air service between Rotterdam and Copenhagen, from April 20 to October 31, 1925—when the service was suspended—are as follows :—Passengers, 978 ; goods, 21,639 kgs. ; parcels post, 1,333 kgs. ; mails, 590 kgs. In the Rotterdam-Copenhagen direction, 99 per cent. efficiency was maintained, only two flights being cancelled on account of unfavourable weather. In the opposite direction, the figure was 98 per cent. This service will be resumed, with larger and faster, machines next April—the daily service to Bremen and Hamburg being still maintained.

Jupiter-Fokkers for "K.L.M."

The original fleet of Fokker monoplanes operated by K.L.M. on its various air services having become out of date, this company has decided to dispose of the former, and acquire more up-to-date machines. It may be of interest to note that some recent tests with a Fokker F.VIIA fitted with a Bristol "Jupiter" engine have shown such excellent results that the K.L.M. has placed an order with the Fokker Works for several of these machines. This particular model, which accommodates eight passengers and two pilots, attains a cruising speed of 170 kms. per hour (155·4 m.p.h.), whilst the general performance, climb, and stability are said to be excellent.

"PROFESSIONAL NOTES," No. 42

THE Air Ministry, Meteorological Office, has just issued "Professional Notes," No. 42, under the title of "The Investigation of the Winds in the Upper Air from Information regarding the Place of Fall of Pilot Balloons and the Distribution of Pressure," by J. Durward, M.A. This note discusses the horizontal displacement of pilot balloons in relation to the distribution of pressure. The data used are obtained from post-cards, on which the date, place and time of origin are entered, attached to pilot balloons. These balloons are released three or four times a day at many stations, and the finder is requested to return the card after entering the place and time of finding. During 1923, over 1,000 cards were returned, and it is found that on about 80 per cent. of these occasions the direction of the displacement of the balloon was within 40 deg. of the direction of the surface isobars. Certain cases are noted in which the direction of displacement differs very much from the run of the surface isobars ; these cases are generally found to be associated with low-pressure systems. On the south side of the centre of a depression the westerly wind may attain a very high speed ; one definite case was found in which the maximum speed at 25,000—30,000 ft. must have been over 200 miles per hour. This method of investigation is attended by so many uncertainties, that it is on the whole inferior to the careful observation of high clouds. On the other hand, it is practicable in all weathers. Copies of the publication can be obtained from all branches of H.M. Stationery Office, or through any bookseller. Price 1*s*. 6*d*. Postage ½*d*. extra.

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Air Mails during 1925

THE Postmaster-General communicates the following particulars of outgoing British Air Mail traffic during 1925. There has been an increase in the total weight of letter mail during the year, and the total weight despatched by air has now risen to 15,520 lbs. The increase has been most marked in the mails to Paris and to Morocco and Algeria, which have increased by 19 per cent. and 33 per cent., respectively. By the latter service 2,500 lb. of letters were despatched during the year. One of the heaviest of the letter mails is that for unoccupied Germany (Hanover, Berlin and Hamburg). This increased by over 10 per cent. ; and the mails for Belgium, and for Denmark, Norway and Sweden also showed increase. Considerable use was made of the air services established in Continental countries to supplement the service afforded by Imperial Airways where necessary ; and new letter air mails were instituted to the East Baltic countries and Russia, the latter of these attracting as much as 680 lb. of letters in the four months of 1925 during which it was in operation. This service has occasionally been used in the inward direction for mails from the East brought by the Trans-Siberian Railway ; the course of post from Shanghai to London has thus been reduced to about 15 days. Facilities for using the New York-San Francisco air mail service were also made available in May last, but hitherto little use has been made of the service. The Cairo-Baghdad service has worked with marked regularity. It continues to carry a considerable volume of mails in spite of the competition of the trans-desert motor service between Haifa and Baghdad. The air parcel service continues to carry a substantially greater volume of mails than the letter service. The total weight of the parcel air mails on the whole of the Continental services in operation was 50,000 lb., apportioned among the several services as follows : Paris, express 13,600 lb., non-express 10,200 lb., Holland 13,200 lb. ; Germany, including the Rhine Army, 13,000 lb.

The Aero Golfing Society

THE following is a list of fixtures of the above society for 1926 :—

March 1.—Team Match, Ae.G.S. *v*. Stage Golfing Society, at Oxhey Golf Club.

March 18.—Winter Meeting, at Addington Golf Club, for Ae.G.S. Challenge Cup, presented by Sir Samuel Instone.

April 10.—Team Match, Ae.G.S. *v*. Moor Park Club, at Moor Park, Rickmansworth.

May 6.—Spring Meeting, at Huntercombe Golf Club, for Ae.G.S. Challenge Cup, presented by the proprietors of FLIGHT.

June 12.—Team Match, Ae.G.S. *v*. Frilford Heath Golf Club, at Frilford Heath, near Abingdon.

July 15.—Team Match, Ae.G.S. *v*. R.A.F. Club (course to be arranged).

October 14.—Autumn Meeting, at Wentworth Park, Virginia Water Golf Club, for Ae.G.S. Challenge Cup, presented by Cellon (Richmond), Ltd.

COMPANY DOINGS

The De Havilland Aircraft Co., Ltd.

THE annual meeting of the de Havilland Aircraft Co., Ltd., was held on December 22, at which the chairman Mr. A. S. Butler, said he was pleased to state that the very successful results hitherto attained had been well maintained, and that there was a substantial increase in turnover made since the formation of the company five years ago. Referring to the more particular records of the past year, he drew attention to, firstly, the production of the "Moth" (D.H.60) light aeroplane, which was produced in response to the growing demand for a machine on which flying training could cheaply and efficiently be carried out by the light aeroplane clubs. He was pleased to say that these machines had given every satisfaction, and furthermore, there were already two private owners of "Moths." Secondly, he referred to the highly successful flight by Mr. Cobham, on a D.H.50, to India and back, carrying Air Vice-Marshal Sir Sefton Brancker. It was due entirely to the proved efficiency of these machines, as evinced by this and previous flights, that they were now being built under licence in Belgium, Czechoslovakia, and Australia. The chairman then referred to the growing demand for the company's products from all parts of the world. Both military and civil sides of the company's business had been developed together. A resolution to pay a dividend of 10 per cent. was passed unanimously.

Rolls-Royce, Ltd.

THE directors, in their nineteenth annual balance sheet and report for the year ended October 31, 1925, state that after paying or providing for all trading expenses and suitable depreciation of buildings, machinery and plant, and charging repairs and replacements to revenue, there is available for distribution the sum of £165,722 11*s*. 4*d*., together with the amount of £18,671 16*s*. 1*d*. carried forward from the previous year. The usual rate of depreciation has been applied to the value of buildings and plant. Both the company's models, the "New Phantom" (40-50 h.p.) and the new 20 h.p. chassis, and their aero engines, continue to be in great demand.

The directors recommend a dividend of 8 per cent. per annum (subject to income tax), £65,102 19*s*. 3*d*. ; transfer to income tax account, £25,000 ; to reserve fund, £75,000 ; and to carry forward to next year, £19,291 8*s*. 2*d*.

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AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations : Cyl. = cylinder ; i.c. = internal combustion : m. = motor. The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

APPLIED FOR IN 1924

Published January 14, 1926

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25,432. DOUGLAS MOTORS, LTD., and S. L. BAILEY. Engines. (244,558.)

25,433. DOUGLAS MOTORS, LTD., and S. L. BAILEY. Mechanical starting devices for engines. (244,559).

26,544. M. WOLF and A. MERTZ. Portable or other engines. (244,564.)

27,711. C. H. CLAUDEL. Aeroplanes. (244,569.)

APPLIED FOR IN 1925

Published January 14, 1926

11,226. Luftschiffbau Zeppelin Ges. Rigid airships. (240,406.)

Secret Patent Re-assigned to the Inventor

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Published January 14, 1926

541. A. M. LOW. Aerial Projectile. (244,258.)

5,632. A. M. LOW. Control of torpedoes, etc. (244,302.)

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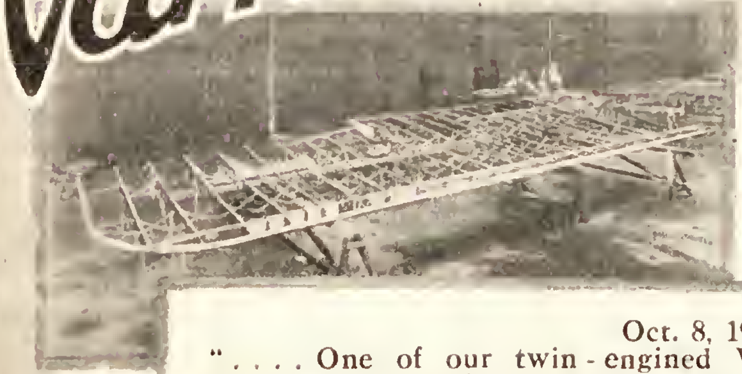

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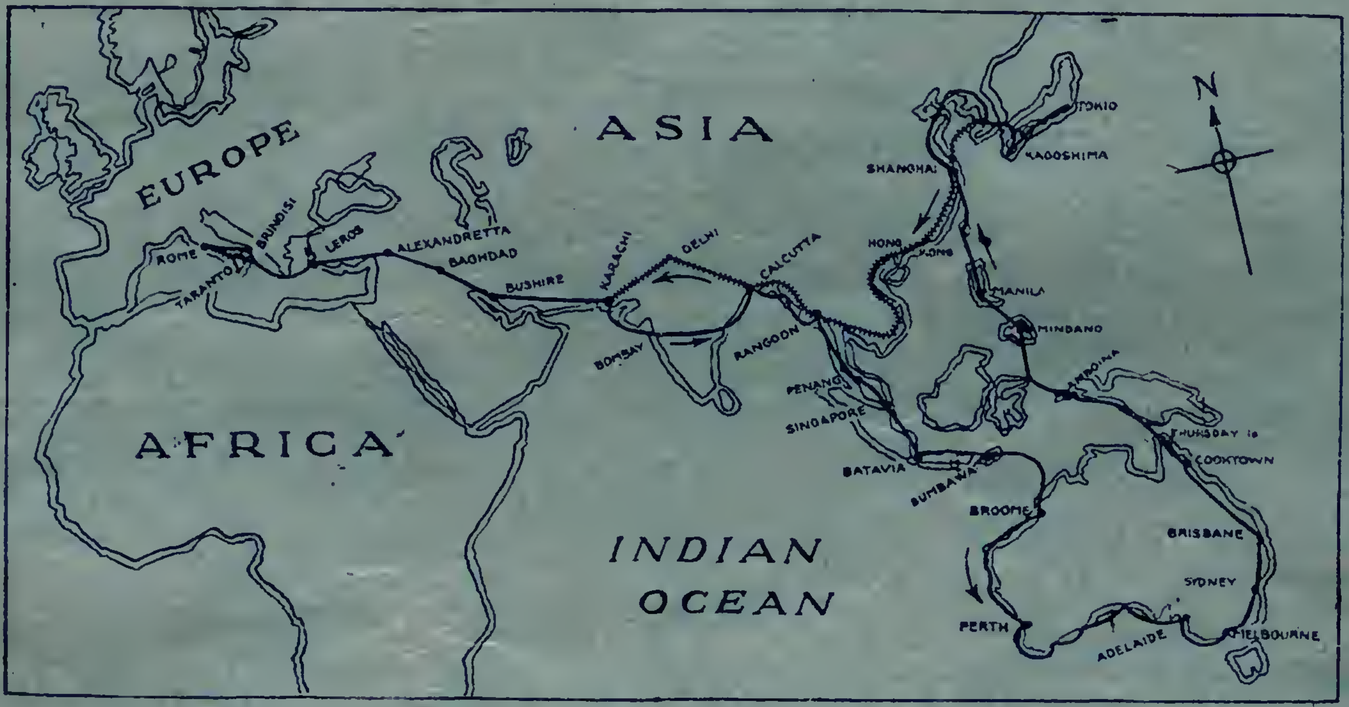

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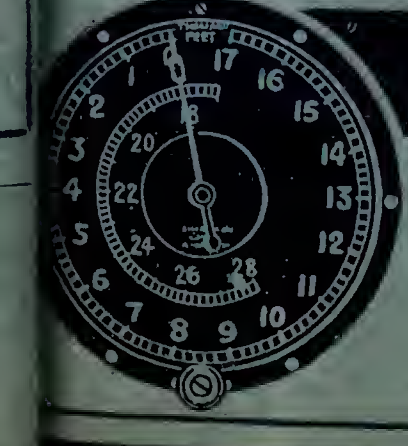

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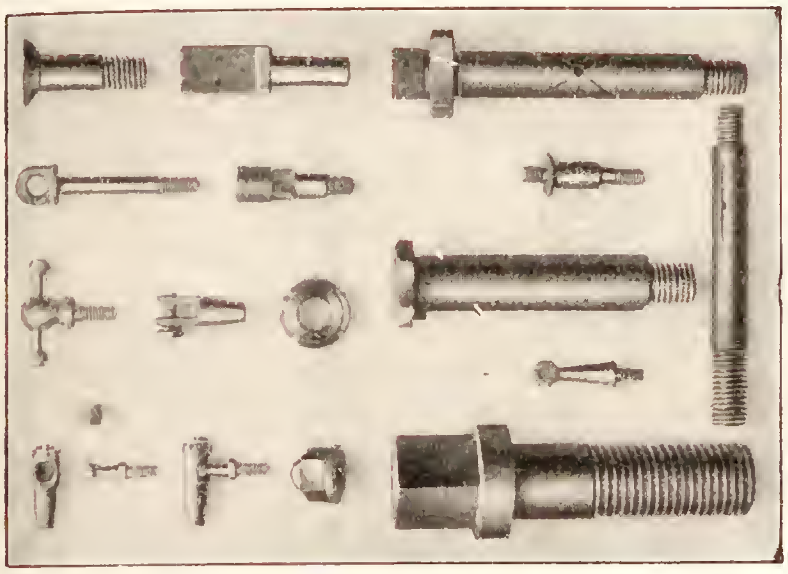

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CONTENTS

	PAGE
Editorial Comment	
The Line of Least Resistance	27
Controllability	29
Hawker Single-Seater Fighters for Denmark	30
Aviation in Ireland	33
Security in the Air	34
Correspondence	35
Royal Aeronautical Society 60th Anniverary	36
Federation Aeronautique Internationale	36
An Air-Cooled Liberty Engine	37
Across Australia in Two Days	38
Light 'Plane Club Doings	38
Royal Air Force	39
R.A.F. Intelligence	39
Society of Model Aeronautical Engineers	40
Imports and Exports	40

DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:—

1926	
Jan. 21	Maj. J. S. Buchanan. "The Schneider Cup Race, 1925," before R.Ae.S.
Jan. 26	Lieut. Olechnovitch. "The Care and Maintenance of Tools as an Important Factor in Workshop Routine," before Inst.Ae.E.
Feb. 4	Joint Meeting of R.Ae.S. and Inst.A.E. at R. Soc. of Arts. Mr. C. L. Lawrance, "American Aircraft Engine Development."
Feb. 9	Informal Meeting, Inst.Ae.E.
Feb. 25	Mr. A. J. Cobham. "Long-Distance Aeroplane Flights," before R.Ae.S.
Mar. 4	Maj. G. H. Scott. "Development of Airship Mooring," before R.Ae.S.
Mar. 9	Mr. O. E. Simmonds, M.A., A.F.R.Ae.S., M.I.Ae.S. "The Development of Civil Marine Aircraft," before Inst.Ae.E.
Mar. 18	Flight-Lieut. H. Cooch. "Landing Aeroplanes in Fog," before R.Ae.S.
April 13	Mr. S. H. Evans, B.Sc. "The Performance of Modern Aircraft—with special reference to the Variable Wing," before Inst.Ae.E.

EDITORIAL COMMENT.

The Line of Least Resistance

BRITAIN'S history in the air, since the war, 1914–18, has been a peculiar one. After the war we reduced what was then the most magnificent Air Force in the world, to a mere nucleus. Personnel was discharged on a wholesale scale. Materiel was stored or destroyed. Research was reduced to a minimum, all the aircraft construction firms tottered, figuratively, on the brink of bankruptcy, and more than one disappeared. In short, the nation revelled in an orgy of "economy." Great Britain having, in a spirit of example and of goodwill towards all men, sacrificed her leading position in the air, won at enormous cost in blood and treasure during the war, took time to look around, when lo and behold, with the exception of Germany (at one time imagined to be conquered), other nations had signally failed to follow suit. Not only did the great nations maintain their air strength, but a number of smaller nations were quick to realise the vast possibilities which an air force offered, and were commencing to build up air forces of their own. It speedily became clear that we had been over prompt in indulging in our good intentions—and in imagining that we were saving money on defence. Somewhat of a panic was the not unnatural result, and by 1923 the Government had realised that "economy" could be, and indeed had been, carried too far, in fact to the verge of foolhardiness. In that year an air programme was adopted which at the time was considered to represent the minimum necessary for the defence of the country against air attack. During the following years the 1923 policy was adhered to by successive Governments (including the Labour Government of 1924), and our air defences were slowly but gradually being built up—much too slowly in the opinion of many—until it had become accepted that no Government would dare again to contemplate such drastic "cuts" as those which shortly after the war very nearly resulted in the total disappearance of the British aircraft industry. Yet we are now told that reductions almost as drastic are contemplated. The Government—a Conservative one at that—is reported to be planning the postponement of the home defence scheme which has for several years now been regarded by all parties as essential to the safety of the country.

It is obvious to anyone who makes any pretence of having given the subject more than a passing thought that the pivot of the whole position is the aircraft industry. Unless that industry is kept alive, and kept alive to such an extent as to be capable of immediate expansion in case of emergency, our air defence must rest on a very insecure basis. Yet it appears that this vital industry is again to be faced with starvation, and that at a time when more than ever a continuity of policy is essential. The British aircraft industry in the past has suffered—more than most people realise—from a lack of such continuity. Orders have been given by fits and starts, works have been feverishly busy for short periods, followed by long waits for another order. One result has been the inevitable, viz.: that it has not been an easy matter to attract finance to the industry, and what is, perhaps, more important still from a national point of view, such few machines as have been ordered and delivered have necessarily been a good deal more costly than they need have been if the system of placing orders had been continuous instead of intermittent. During the "economy" years some 20 aircraft firms succeeded in weathering the storm, at what sacrifice will probably never be fully realised, and it came to be accepted that if the country were to enjoy any measure of security it would be highly dangerous to go below that number. Yet if the contemplated reductions in air expenditure reported are really to come about, we venture to predict that more than one of the existing aircraft firms will have to close down, at a loss to the Empire which cannot be assessed in intrinsic value, and with the result that many trained expert workers will have to leave the trade of which they have made a speciality and in which they excel. Even apart from the national safety point of view, and placing the matter on the lowest level, the "economy" will be a false one, since the country will in very many cases, be paying a highly-skilled man the dole instead of paying him for doing work of real national importance, whilst the leeway which will have occurred must sooner or later be made good at an ever-increasing cost.

In view of the fact that these things are apt to be forgotten, may we try the patience of our readers by quoting a few figures relating to Britain's post-war air history? Figures are, we realise, generally dry, but in this case they are illuminating. The Air Estimates for 1919–20 showed a maximum establishment at home and abroad of 150,000 officers and men, and the total estimate for the year was £66,500,000.

In the Air Estimates for 1920–21 the number of personnel was reduced from 150,000 to 29,730 and the net estimate from £54,030,850 to £21,056,930. The following year, 1921–22, the personnel voted for was 30,880, and the total net estimate was £18,411,000.

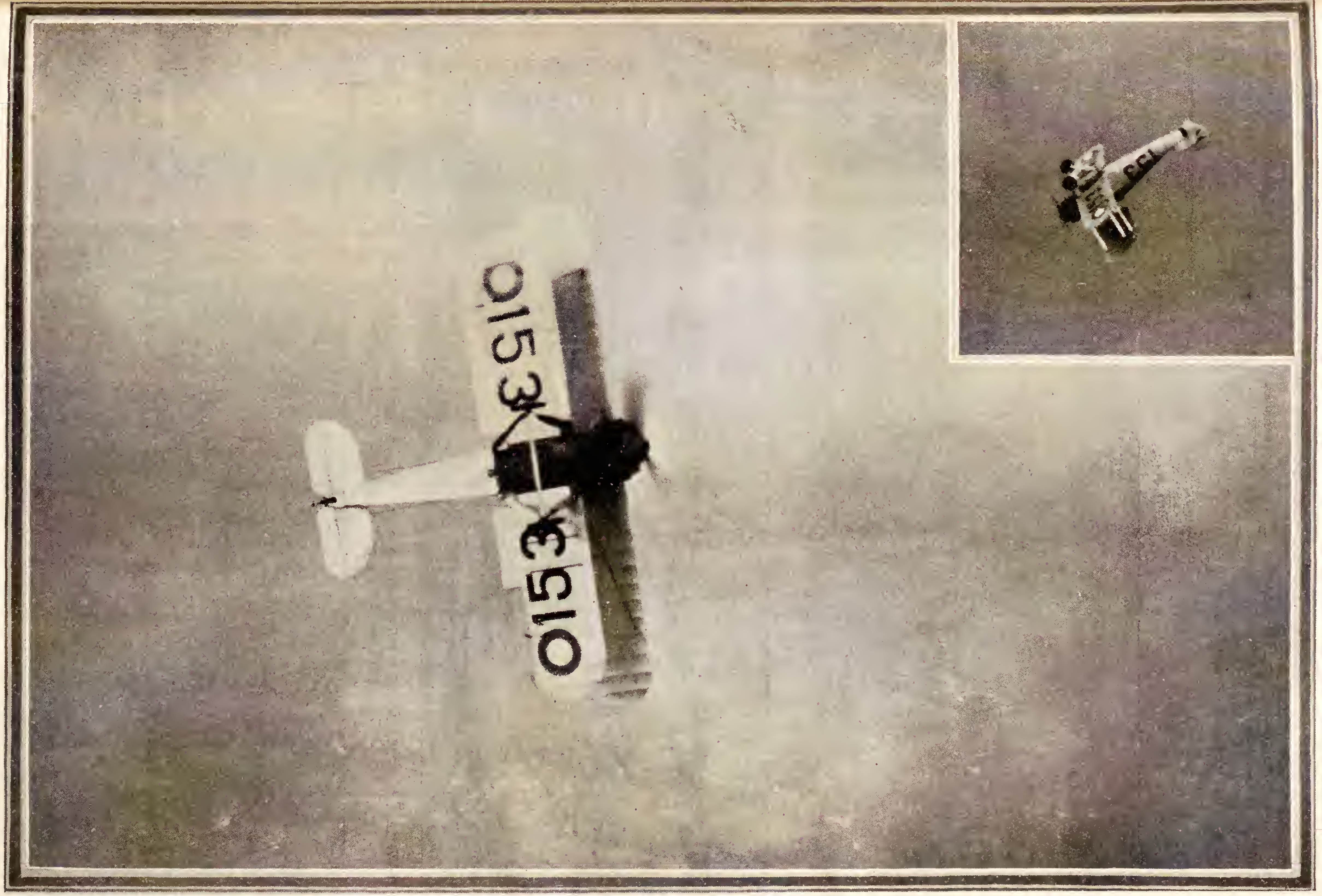
By 1922–23 the "Geddes Axe" had got busy, and the personnel was 31,176. This appears as an increase, but actually during the previous year increases had been made which brought the personnel up to 40,880 instead of the 30,880, so that in point of fact there was a decrease. The most drastic reduction that year was found in the total net estimate, which sank to the relatively very low figure of £10,895,000. That year was the low-water mark in the Air Estimates, and from then onwards a steady increase is to be found. Thus in the 1923–24 Estimates we find a personnel of 33,000, and a total net vote of £12,011,000. The 1924–25 Air Estimates were signed by Lord Thomson—in other words, were the Labour Government Estimates—and, in spite of this fact they showed an all-round increase:—Personnel 35,000, and net air vote £14,511,000. By 1925–26 there was an increase in personnel of 1,000, *i.e.*, a total of 36,000, and the net vote had risen to £15,513,000.

The general increase in the Air Estimates during the years following the "Geddes Axe" year are due to a general admission that the air has become our "first line of defence." This view appears to be shared by all parties, and that being so, and more especially in view of the fact that development in the technical sense is rapid in air matters, it becomes dangerous to attempt "economies."

What makes the position even more difficult is that it is becoming clear that in the national interest a change in policy is required as regards aircraft construction. Hitherto, as readers of FLIGHT will be well aware, machines have been built in the main of wood. We have no intention here to enter into a discussion of the relative merits of wood and metal from a technical standpoint. But the hard cold fact has to be faced that the world's supply of suitable timber is running very short indeed, and that whether we like it or no, we shall have, if for no other reason, to turn to metal construction in order to ensure supplies in case of emergency. That being so, our aircraft firms will, during the next few years, be faced with the problem of evolving methods of construction in metal which shall be technically effective, and at the same time shall be based upon the use of materials obtainable in time of war. These technical problems are sufficiently serious and difficult in themselves, but if our aircraft firms are to be, in addition, kept on short rations in the matter of orders, then the outlook becomes black indeed.

Briefly summarised, the position may be stated somewhat as follows:—The Air is now the Nation's First Line of Defence. The basis of an effective and efficient air force, capable of expansion in time of need, is a healthy aircraft industry. An aircraft industry, to keep pace with developments abroad, must be adequately supported by the Government, in the form of orders, otherwise it either cannot exist at all, or at best it cannot make the technical progress which the rapid development of aircraft design, the world over, demands. Surely the argument is logical enough in all conscience.

Lest we should be accused of "having an axe to grind," we publish elsewhere in this issue a leading article from *The Daily Telegraph* of January 19, 1926, in which that newspaper, always eminently sane, well-balanced and unbiased in all matters, especially those relating to the British Empire, and certainly not likely to start unnecessary "scares," utters a word of warning concerning the slowing up of air development. The views expressed by *The Daily Telegraph* so precisely tally with those put forward in FLIGHT for years that we feel they form a corroboration, from a totally unbiased source, of what FLIGHT has so long been preaching, and we have therefore felt justified in publishing the article in full.



[" Flight " Photographs.

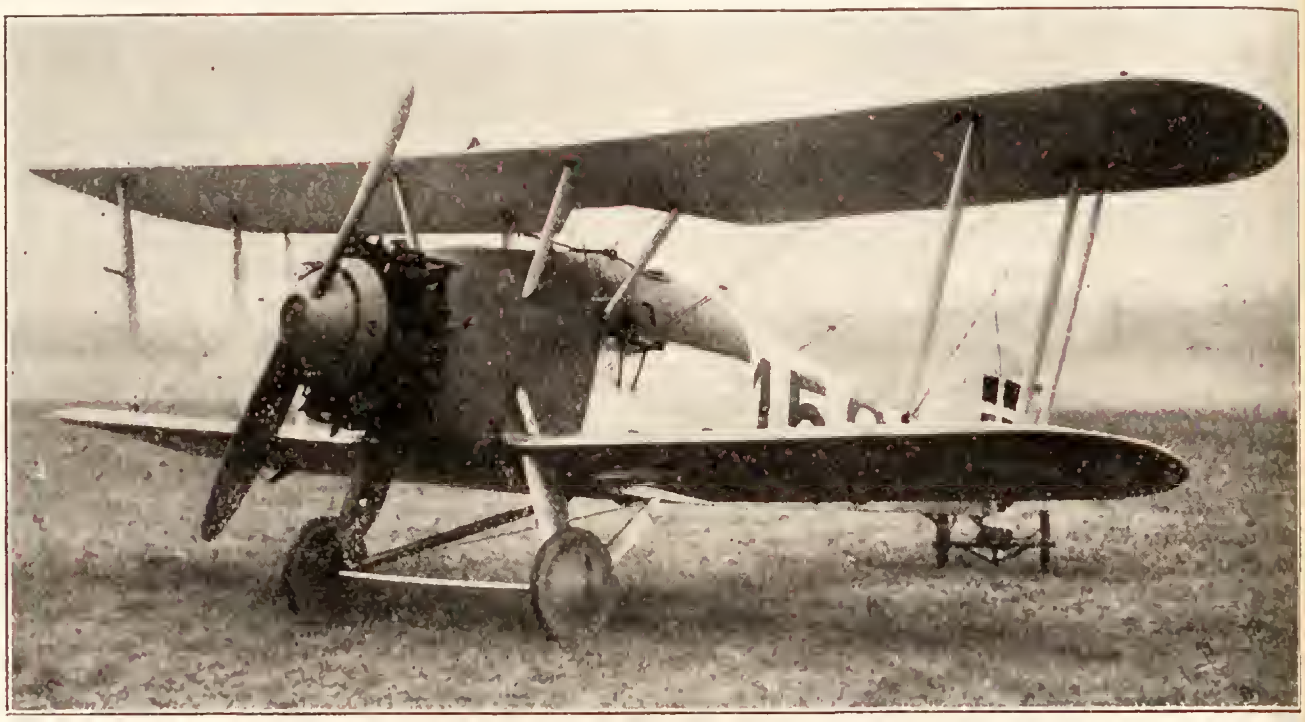
CONTROLLABILITY : These two photographs of the Hawker "Danecock," photographed from another aeroplane, show two stages of a "slow roll" carried out by Flight-Lieut. Bulman, the firm's chief test pilot. In the larger photograph the machine is seen going into a left-hand roll, and the port ailerons can be seen to be in the maximum "up" position. In the inset the machine is on its back and is commencing to dive into a normal position.

AN ANGLO-DANISH ALLIANCE

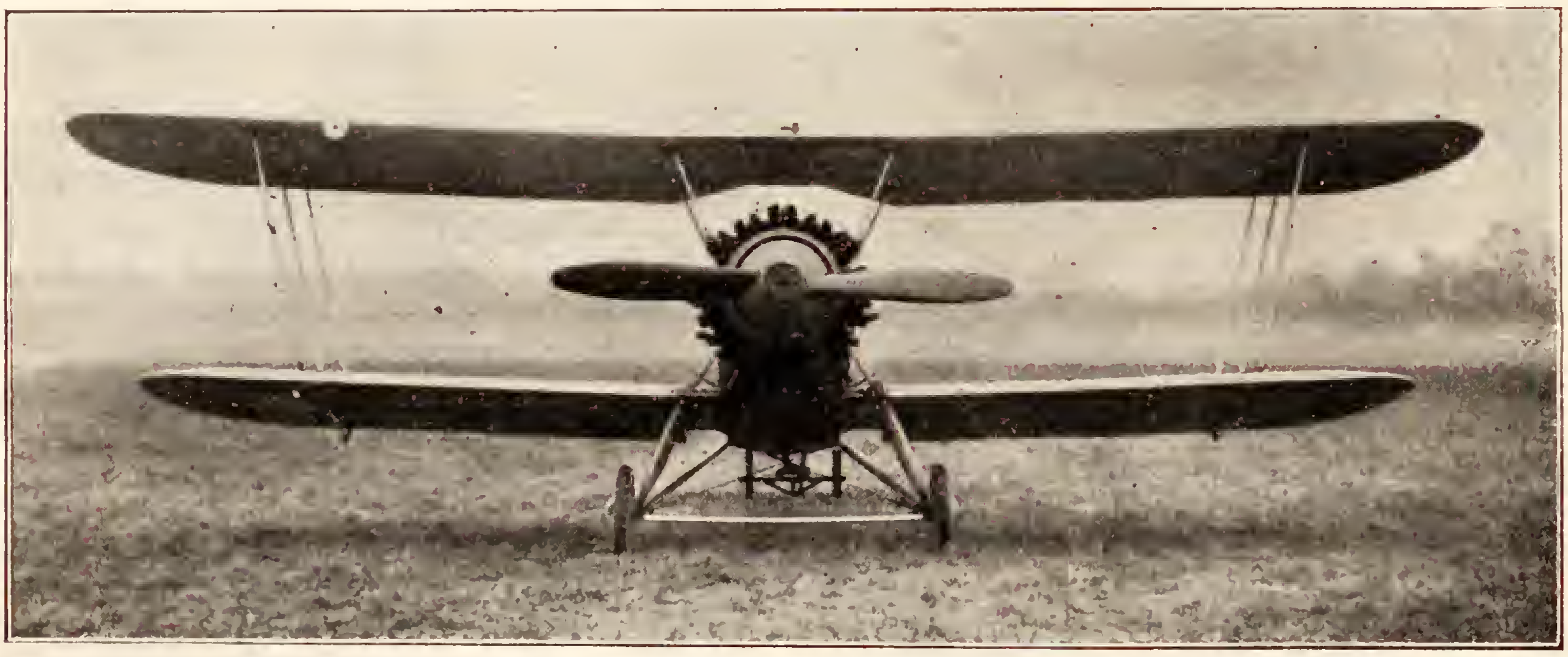
Hawker Single-Seater Fighters for Denmark

SOME time ago we announced in FLIGHT that the H. G. Hawker Engineering Co., Ltd., of Kingston-on-Thames, had received an order from the Danish Government for single-seater fighters. The machines ordered have now been delivered to the purchasers, and it has consequently becom permissible to refer to the history of these machines.

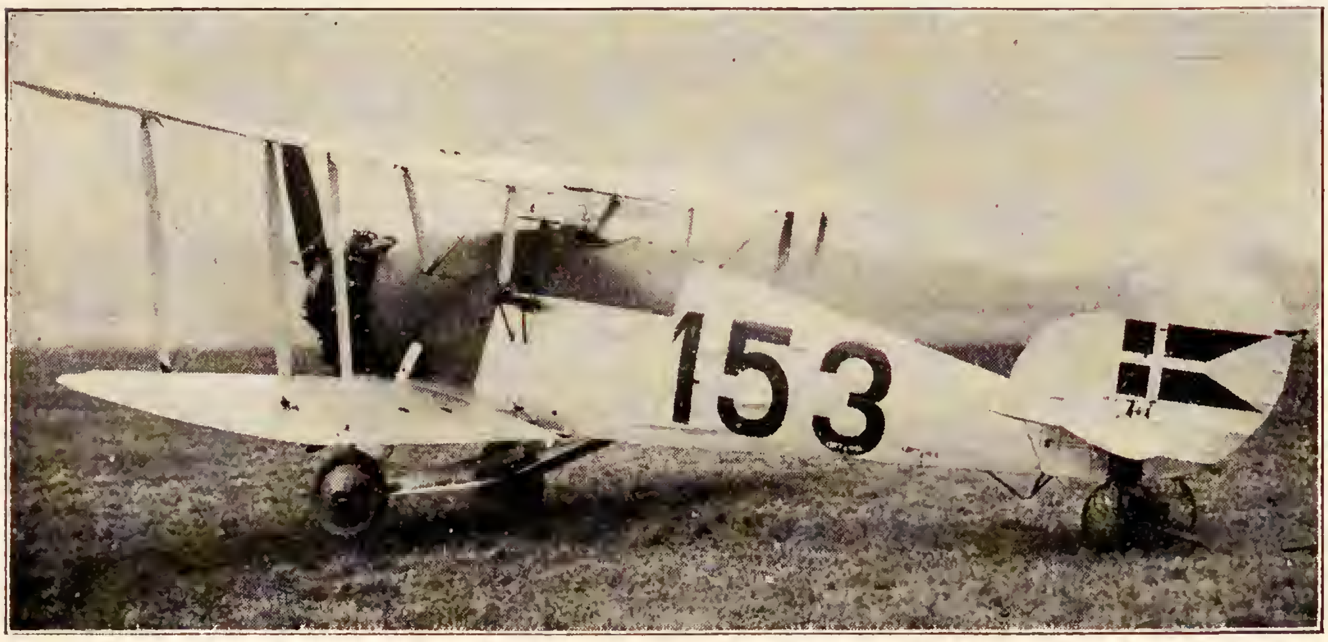
When the Hawker Engineering Company undertook th construction of these machines for the Danish Governmen



The Hawker "Danecock": Three-quarter front view. The engine is an Armstrong-Siddeley "Jaguar."



THE HAWKER "DANECOCK": This front view gives a good idea of the large span single-bay bracing, and the generally "clean" lines of the machine.



The Hawker "Danecock": Three-quarter rear view.

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The 27/60 h.p. A.D.C. "CIRRUS" Engine was the first British Low-powered Aero Engine to pass the Air Ministry 100 hours' Type Test, and has been adopted for use in the de Havilland "Moths" with which the Light Aeroplane Clubs are equipped.
The following opinions of "CIRRUS" owners after some months' running, should be of interest.

"The De Havilland Aircraft Co., Ltd.,
"Stag Lane Aerodrome,
"Edgware.

"21st December, 1925.

(*Extract.*)

"I am sure that you have done extremely well in achieving in such a remarkably short time, the production of an engine which to-day is giving literally no trouble at all.

"There is no doubt that the engine is behaving like one with years of development behind it."

"London Aeroplane Club,
"3, Clifford Street,
"London, W.1.

"17th December, 1925.

"I enclose a table showing the flying carried out by the London Aeroplane Club, from the 19th August to the 30th November, on the two D.H. 'MOTHS,' fitted with 27/60 h.p. CIRRUS engines.

"From this table you will see that flying was carried out on 72 days and that 729 flights were made, resulting in a total flying time of 298 hours 45 minutes.

"We are extremely satisfied with the performance of the two CIRRUS engines supplied by you in the D.H. 'MOTHS.' The only trouble we have experienced with these engines is with the valve seatings, but the modification you made has entirely corrected it.

"I trust that you will find these figures of interest."

"Newcastle-upon-Tyne Aero Club, Ltd.,
"38, Cloth Market,
"Newcastle-upon-Tyne.

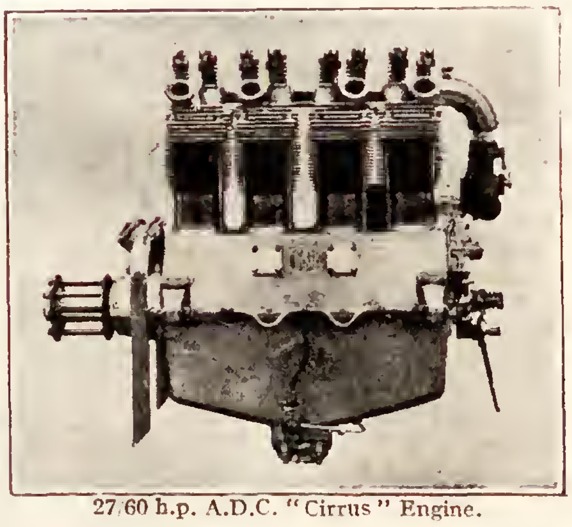
"25th November, 1925.

(*Extract.*)

"The Cirrus engines fitted to the machines have proved exceptionally reliable and economical.

"The only replacements necessary on the two engines have been two new cylinder heads, the valve seatings of which were found by the representative of the A.D.C. Aircraft, Ltd., when carrying out a modification, to have moved an almost inappreciable amount in the cylinder heads. The particular engine in which this very slight defect, which was not noticeable in running, was found had done 49·5 flying hours, and 58 hours total running.

"No other replacements whatsoever have been necessary on either engine, although over 100 hours flying has been done."



27/60 h.p. A.D.C. "Cirrus" Engine.

LONDON TO DUBLIN.

The recent fine flight by Colonel The Master of Sempill (including a 70 mile sea crossing), was carried out with a de Havilland "Moth," fitted with an A.D.C. "Cirrus" Engine.

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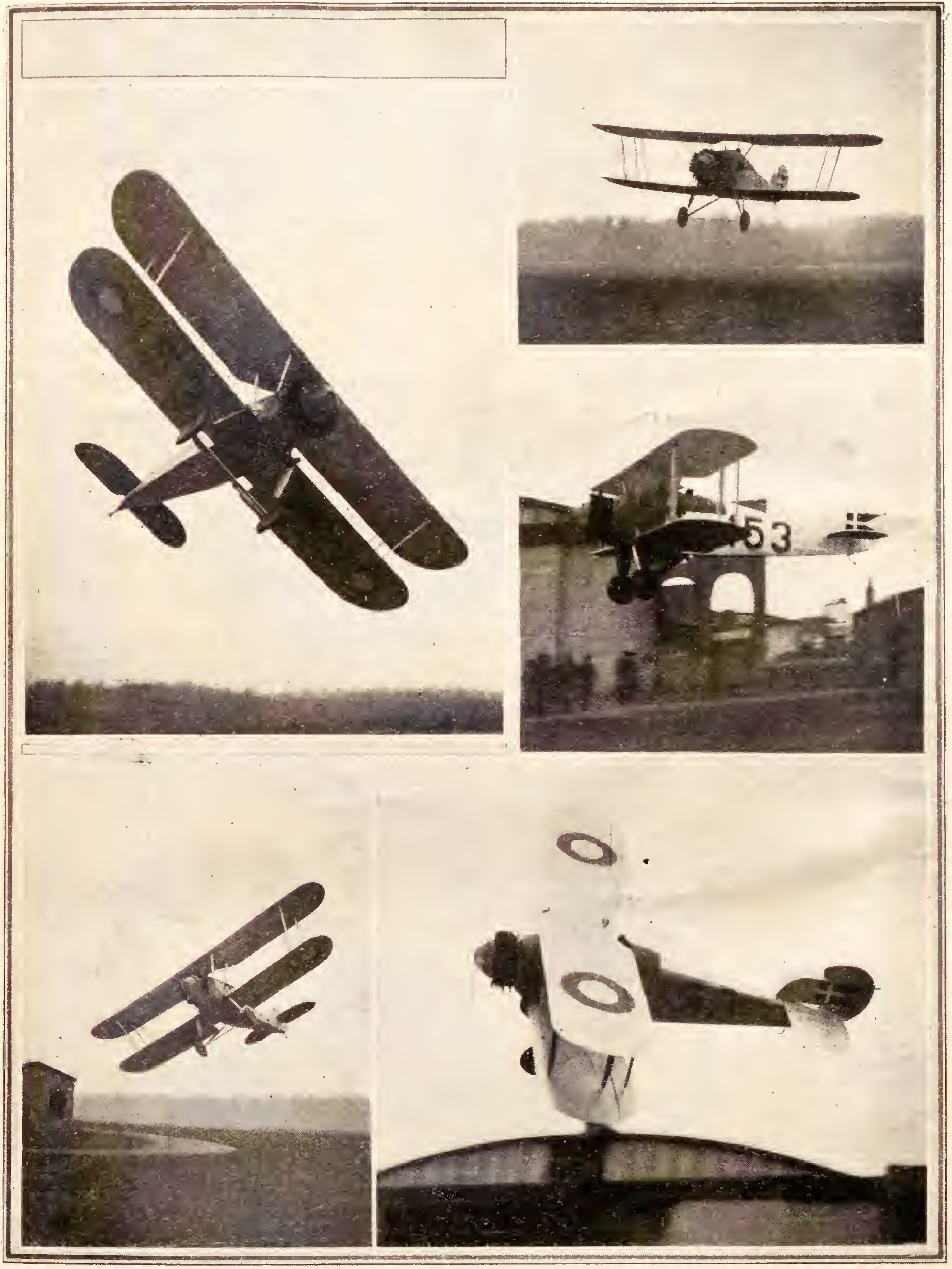
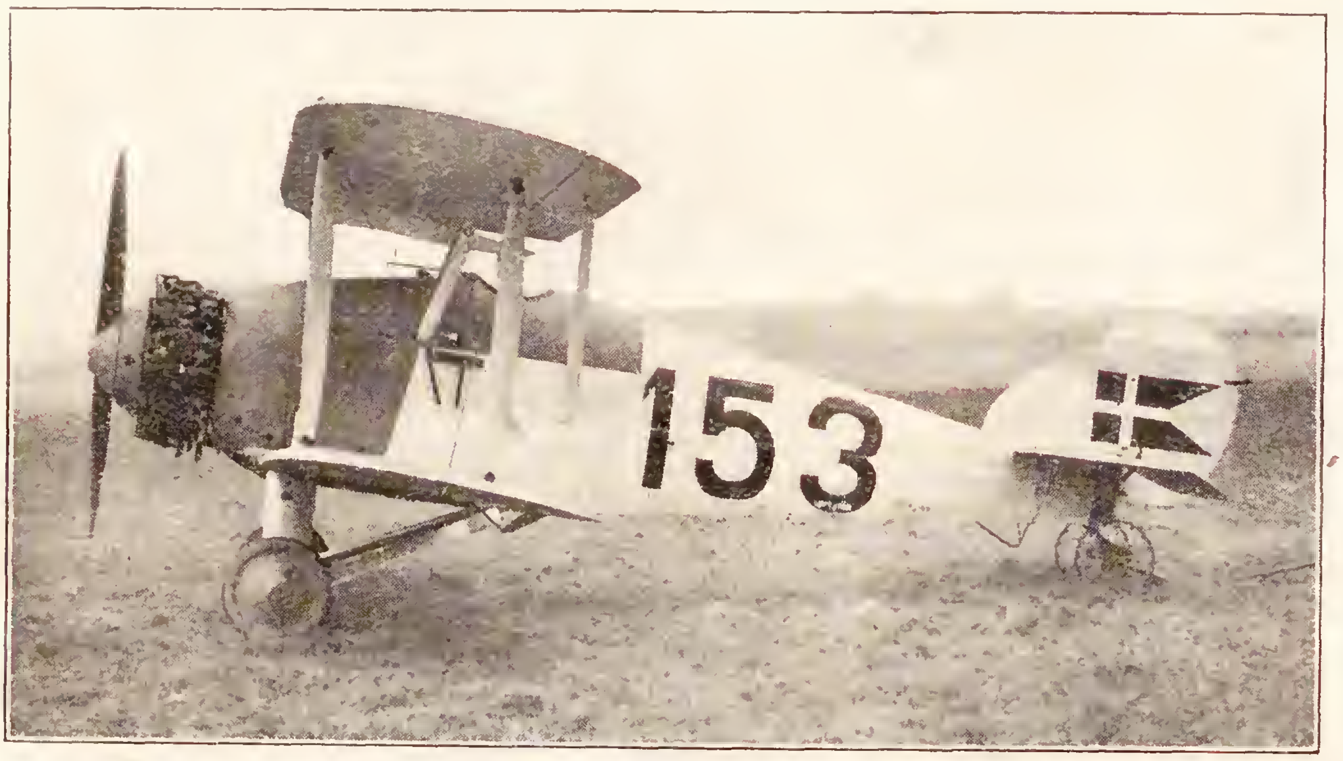


[FLIGHT *Photographs*

AN ANGLO-DANISH ALLIANCE: This series of photographs show the Hawker "Danecock" with Armstrong-Siddeley "Jaguar" engine, of which three were recently delivered to the Danish Government. A further number will be built at the Naval dockyards at Copenhagen. These photographs were secured during a test flight at Brooklands recently, and show the machine in a number of various attitudes. The pilot was Flight-Lieut. Bulman. (See also p. 29.)

a guarantee had to be given as to a structural weight and performance figures with full load, and, furthermore, the machines had to be completed by a certain date—a date, incidentally, which did not leave the Company very much time for building the machines. It is worth placing on record as a somewhat uncommon fact that the machines for Denmark were actually tested, accepted, packed and shipped to Copenhagen five weeks before they were due for their first flights. Knowing the difficulties of ever getting aeroplanes finished to time, we think that this achievement by the Hawker Engineering Co. is one of which all concerned may well be proud. Incidentally, it might be mentioned that when the machines were finished the structural weight was found to be below the guaranteed figure, in spite of certain increases in equipment, while the performance was considerably in excess of that stipulated in the contract.



The Hawker "Danecock": Side view. Note the Danish flag on the rudder.

Under the agreement entered into with the Danish Government, the latter ordered three machines from the Hawker Engineering Co., and a further batch, the actual size of which we are not permitted to disclose, but which is very considerable, is to be built in the Naval Dockyard at Copenhagen under licence from the Hawker Engineering Company.

We had the privilege to be present recently during t carrying out of the acceptance tests of one of the Hawk "Danecocks," as the machines for Denmark have bee named, Flight-Lieut. P. W. S. Bulman being the pilot this occasion. It is not permissible to give performan figures of the "Danecock," but it may be said that t all-round performance is very good indeed, and compar not unfavourably with that of the "Woodcock," from whic the "Danecock" has been evolved. In the hands of suc an exceptional pilot as Lieut. Bulman, the machine was, course, shown to the very best advantage, and the manœuvrability appeared to be extremely good One of the tests carried out by Lieut. Bulman consiste in a very steep climb off the ground; in fact, it migh almost be termed a vertical climb, terminating at the to in a large loop. Both the climbing angle and rate of clim seemed to be exceptionally good, and the machine loope very cleanly indeed.

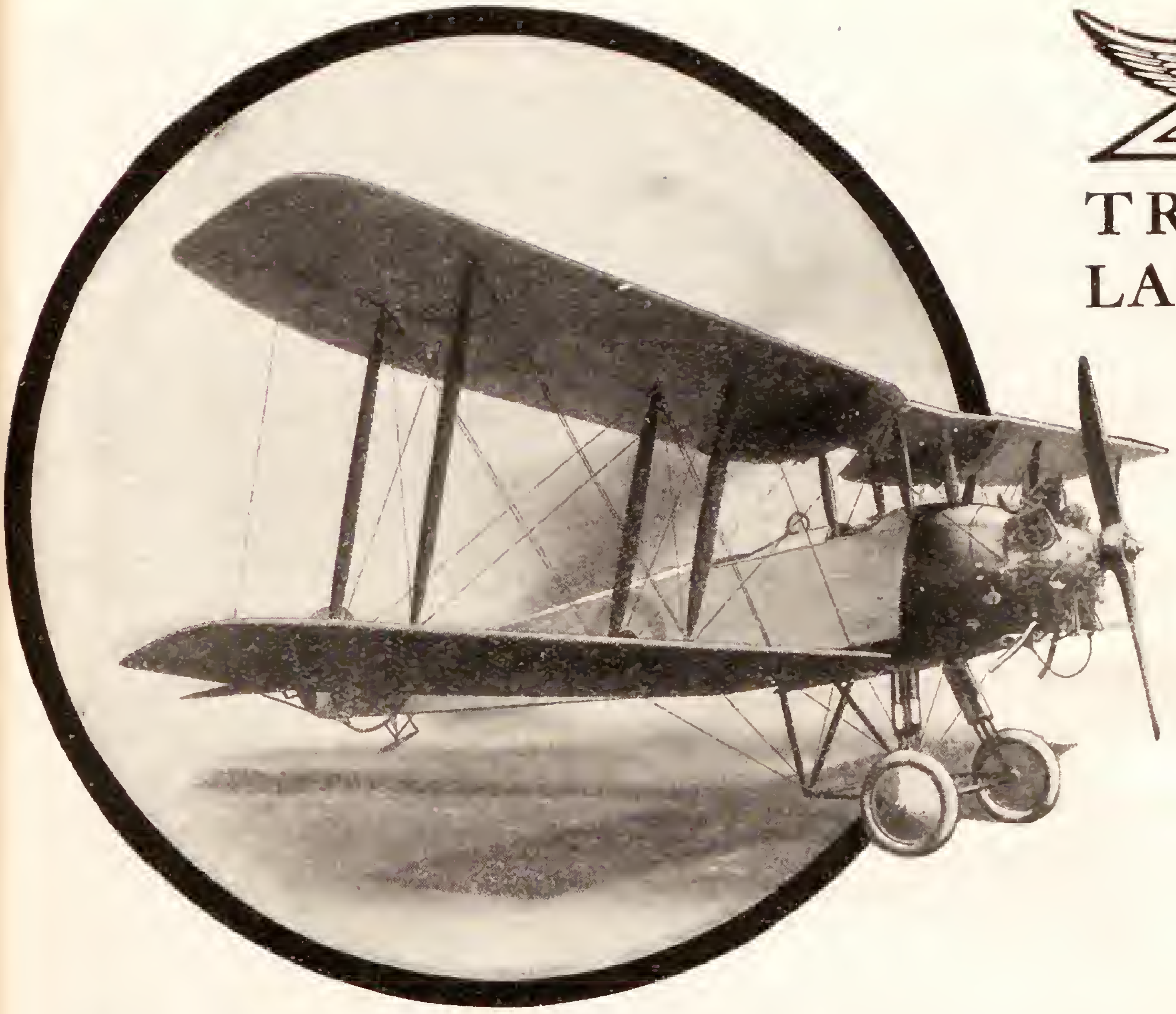
In another test Lieut. Bulman took the "Danecock" up to a considerable altitude, and then proceeded to fl at extremely low forward speed. The actual figure is no available, but appeared to be in the neighbourhood

An Anglo-Dane Alliance: In this group are seen representatives of the Hawker Engineering Company, Armstrong-Siddeley Motors, and the Danish Government. From left to right: Capt. Proctor (Armstrong-Siddeley), Mr. L. A. Pollard (Hawker), Mr. C. V. Thymann (Royal Danish Navy), Mr. H. K. Jones (Hawker), Lieut. P. W. S. Bulman (Hawker), Lieut.-Commander Victor (Royal Danish Navy), and Mr. F. I. Bennett (Hawker)

AVRO

TRAINING LANDPLANE

Type 504 N.



THE AVRO "Lynx" Dual Control Training Machine represents a marked advance on the world famous AVRO 504 K in that the magnificent flying qualities of the latter machine have been amplified by additional power and by constructional improvements, some of which are mentioned below. The AVRO "Lynx" is the MOST UP-TO-DATE TRAINING MACHINE IN THE WORLD.

In place of a rotary engine a Siddeley Lynx Radial Air Cooled engine is fitted. Petrol consumption at full power is approximately 12 gallons per hour. An important feature, however, is that the machine can fly with the throttle only just open and a satisfactory cruising speed can be maintained at about quarter throttle, with a petrol consumption of not more than 7 gallons per hour.

An adjustable Tail Plane for dual control is fitted. Centre Section Plane and Wing Roots allow a much greater forward and upward vision for both pilot and pupil. New shape ailerons lighten and harmonise the lateral control with the elevator and rudder controls.

Either a land or sea undercarriage can be fitted.

The Standard AVRO 504 N carries pilot and pupil. It can, however, be adapted as a light commercial machine to carry pilot and two passengers.

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45 m.p.h. While flying thus slowly, the machine was dropped first on to one wing tip, and then on to the other, showing that even at the stalling speed the lateral control was sufficiently powerful to change from a vertical bank to one side into a vertical bank to the other without the machine ever swerving off its course. When coming in to land, the "Danecock" was seen to float into the aerodrome at a speed which seemed remarkably low for a machine of this type, and after touching the ground, although the undercarriage is not unusually high, the machine seemed to pull up very quickly.

During another flight, on which our photographer went up in another machine, for the purpose of photographing the "Danecock" in and from the air. Lieut. Bulman executed some extraordinarily slow rolls, one of which is illustrated in a full-page photograph. We do not recollect ever having seen rolls carried out better than they were on this occasion, and certainly the Hawker "Danecock" appears to possess a large degree of both manœuvrability and controllability.

Concerning the "Danecock" itself, it is not, unfortunately, possible to say very much, but it may be stated that the machine is a development of the well-known Hawker "Woodcock" supplied to the Royal Air Force. Those familiar with the "Woodcock" will note from the accompanying photographs that a change which is immediately noticeable is the shortening of the bottom plane. The arrangement in this respect is more reminiscent of the Hawker "Heron," although the normal chord of the bottom plane has been retained in the "Danecock." The view from the pilot's cockpit is very good, although probably the relatively large chord of the bottom plane causes a good deal more blanketing than does the small chord of the lower plane in the "Heron."

It is interesting to note that the equipment of this machine is to be almost entirely British, this referring to the armament, electric plant and the majority of the instruments carried, while a few additional "gadgets" of Danish make are to be fitted when the machines are put into service in Denmark.

The engine fitted in the Hawker "Danecock" is an Armstrong-Siddeley Jaguar, which firm thus shares with the Hawker Company the credit of introducing British service aircraft into Denmark. Hitherto the Danish Government has been purchasing its aircraft equipment mostly from countries other than Great Britain, mainly, we believe, for financial reasons, but although British aircraft may be somewhat more expensive in first cost, there is little doubt that the soundness of British design and workmanship will soon outweigh this slight disadvantage, and we are quite sure that in the case of the Hawker "Danecock" with its Armstrong-Siddeley Jaguar engine, the Danish authorities will possess a single-seater fighter with a performance equal to that of the best equivalent types of other and much larger nations. At the moment it is, of course, impossible to foresee how the Danish-built machines will compare with the original British prototype, but provided the right materials can be obtained (and we believe the greater part will be obtained from this country), and the Danish workmen trained to the same degree of craftsmanship as obtains in this country, the Danish Air Service should soon be in possession of a fleet of machines which may well cause envy among the service aviators of neighbouring countries.

AVIATION IN IRELAND

Formation of Aero Club

The recent visit of Gen. Sir Sefton Brancker to Ireland has already borne fruit. The very least that may be said regarding his visit is that it has stimulated extraordinary interest in the possibilities of aviation for utilisation in commercial circles. There can be no doubt whatsoever that the development of aviation in Ireland would cause a general and much-needed impetus to vibrate throughout a country placed in an exceptionally fine geographical position for the economic and advantageous operation of aircraft.

At a meeting of Dublin citizens interested in aviation, held recently in the Shelbourne Hotel, Dublin, the inception of the Irish Free State Aeroplane Club took place. It was mentioned that British aeroplane manufacturers were prepared to give most advantageous terms to such a club in regard to the purchase of machines.

A temporary committee was formed to carry out the decisions taken at the meeting.

Maj. Bryan Cooper, C.B.E., presided, and there was an exhaustive discussion of the various aspects of civil aviation as it affects Ireland, which has hitherto shown little interest in the subject—the progress of aviation in England in recent years, the advantages derived from the establishment of an Aero Club to foster and cultivate the "flying spirit," resulting in the formation of so many light 'plane clubs, whose membership consists of people of all classes who realised the great future of aviation.

In Northern Ireland there are two light 'plane clubs, but up to the present the Free State has had no organised body to conduct or promote the development of aerial traffic, and yet Ireland, of all countries, presented with her unique geographical position, natural harbours and landing-places, enjoys almost ideal conditions for aerial traffic. It may also be mentioned that aerodromes are spotted all over the country, having been erected during the Great War, three of those being on the outskirts of the capital.

It was, one speaker said, an anomaly that the Free State, a remarkable transatlantic port, should be lacking an organised body to develop the country's potentialities in this respect. A note upon which stress was laid by all the speakers was that Ireland's commerce will be assisted and her business accelerated by the growth and development of civil aviation.

At the close of the inaugural meeting (to which, unfortunately, the Press were not invited) and after the discussion, the Club was formed, and a temporary committee appointed with Mr. E. J. Macredy as hon. secretary. The subscription was fixed at £3 3*s.* per annum.

The Governor-General, Mr. T. M. Healy, K.C., has signified his intention of supporting the Club, and there can be little doubt that he will be first patron. It was at the Governor-General's residence, the Vice-Regal Lodge, Phœnix Park, that Sir Sefton Brancker stayed during his short visit, and he, no doubt, urged the formation of the club.

Maj. Bryan Cooper, C.B.E., who served with distinction in the Great War, is both capable and energetic, and with his assistance the future of the Club is secure.

London-Cape Town Survey Flight.

Enormous crowds of natives—some of whom had trekked many miles to see for the first time an aeroplane fly—gathered at Jinja when Alan Cobham, with Elliott and Emmott, resumed the London-Cape Town Flight on January 13. With a few preliminary stunts and circuits on the D.H. 50 J (Siddeley "Jaguar") just to show the natives the qualities of the white man's latest "magic," Cobham flew on some 50 miles to Kampala, where some more aerial magic was given out for the benefit of those watching below. Without landing, Cobham then flew along the shores of Lake Victoria Nyanza to Kisumu, Kenya Colony. Here they were received by the Senior Commissioner and scores of highly excited and enthusiastic natives. Before leaving Kisumu on January 18, they took some films and photographs of the port, which is the highest one in the world, being nearly 4,000 ft. above sea level. No difficulty was experienced in "taking off," and after a flight of 400 miles they arrived at Tabora in Tanganyika.

London-Paris Night Air Service

The experimental night air service between London and Paris, which was to have been started by Imperial Airways on January 15, has been postponed, as the special wireless and other accessories being fitted to the Vickers-Rolls-Royce air liner, which was to carry out the experiment, have not yet been completed.

An Aviator-Governor-General

It may be of interest to record that Lord Stonehaven (formerly Sir James Baird), the Governor-General of Australia, owns and flies an aeroplane for the purpose of fulfilling all distant official engagements. Lord Stonehaven is a firm believer in aircraft, and states that Australia offers great possibilities for commercial aviation.

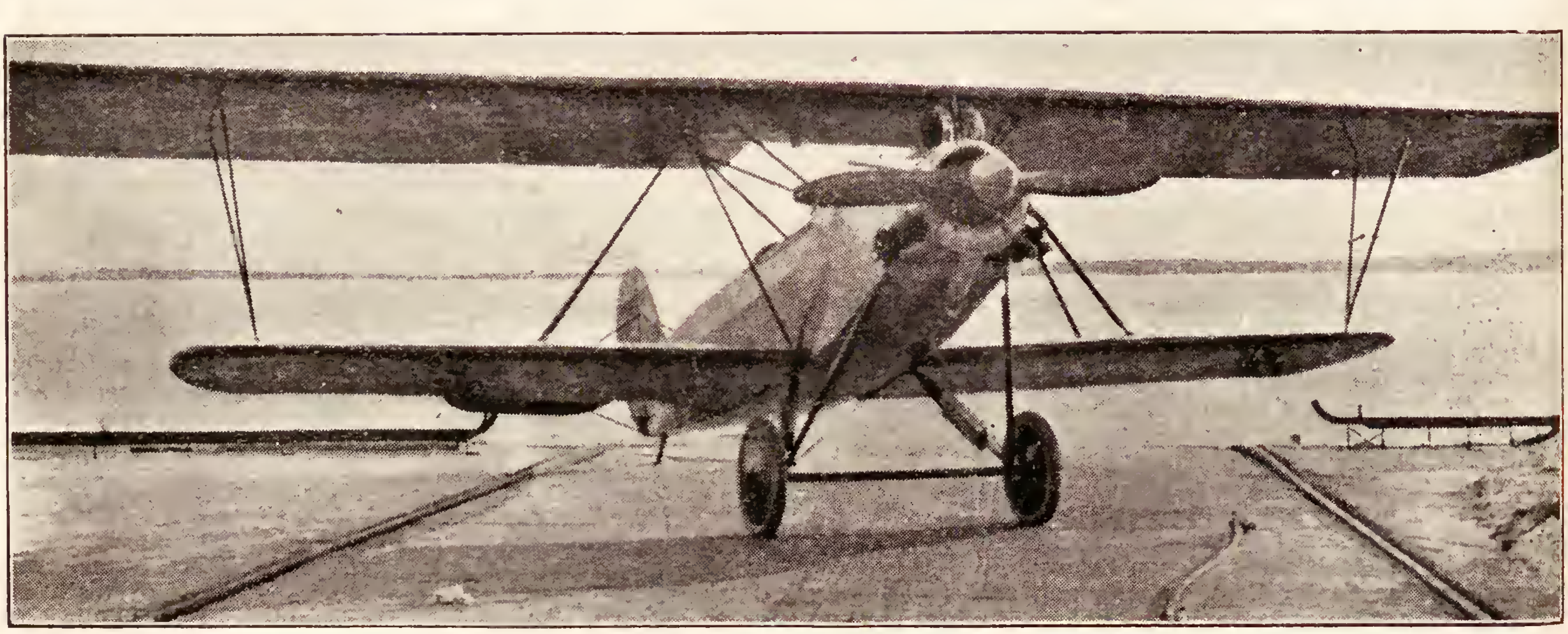
SECURITY IN THE AIR

In connection with our Editorial Comment this week we publish below a leading article from our esteemed contemporary *The Daily Telegraph*, of January 19, 1926, in which the subject of security in the air and the reported slowing up of air development are dealt with in the fair and unbiased manner so characteristic of that newspaper. Thus *The Daily Telegraph* :—

"The Estimates for the financial year 1926-1927 are now under consideration, and the outcome is of exceptional concern to the public because of the need, and yet the admitted difficulty, of balancing a reduction of expenditure with the maintenance of national security. This difficulty is due largely to the fact that the economies now sought are but the latest of a series, after each of which the responsible Ministers and their advisers have declared that the Forces were reduced to the minimum compatible with security. To scrape the bones of a skeleton cannot be expected to produce much result. In such a case a Government is confronted with three possible courses ; to abandon hope of any large savings ; to investigate the completeness of the past 'cuts' and the possibility that their thoroughness may have been exaggerated ; to reconstruct the skeleton on a different scale or model. The appointment of the Colwyn Committee on Expenditure was an attempt to follow the second alternative. If report be true, the savings proposed, while helpful, do not amount to a large sum. Report also suggests that the reduction on the forthcoming Navy and Army Estimates will only bear a small proportion to the total. On the other hand, the Air Minister, in a speech on December 16, forecast very considerable savings in his Department by postponing heavy expenditure that had been planned. 'In the normal course of things the Air Estimates would rise next year by some 30 per cent. as an automatic result of the policy of expansion that has been approved by successive Governments and sanctioned by the House of Commons. This heavy rise, which would have brought the Air Estimates to a sum well over £20,000,000, as compared with the £16,000,000 of this year, would have been most unfortunate at a time when the whole world is thinking of peace, and when every British taxpayer is clamouring for a reduction of Government expenditure.' On the face of it, such a large saving by mere postponement appears the rational course, and, moreover, an ideal way to counterbalance the difficulty of administrative economies in the other Services. Yet is it really anything more than the easy and time-honoured method of avoiding problems rather than facing them ?

"The impression current is that we are to mark time for two, if not three, years in the development of the air programme that, in 1923, was adopted as the minimum necessary for the defence of the country against air attack. The potentialities of aircraft as a weapon against the civil population and the defenceless state of this country were alike realised in that year, and a public outcry arose. On June 26 the Prime Minister, Mr. Baldwin, made a statement in the House of Commons, setting forth the principle on which British air policy was to be based—'A Home Defence of sufficient strength adequately to protect us against air attack by the strongest Air Force within striking distance of this country.' Subsequently, Sir Samuel Hoare announced that it had been decided to create with as little delay as possible a Home Defence force of fifty-two squadrons, so organised as to make further expansion possible if found necessary. These fifty-two squadrons were thus the accepted minimum, for defence not offence, and it was generally understood that the expansion was to be completed in about five years. In 1924 the Labour Government declared its adhesion to this policy, and in March, 1925, with a return of the Conservative Government, the principle was reiterated. Successive Governments of opposing politics have thus endorsed and confirmed both the policy and the principle on which it was based. Are there adequate reasons for throwing it overboard ? Those suggested are, apparently, Locarno and the need for economy. The cry for economy was as strong in 1923 as in 1926, yet the Government who were making much heavier cuts than to-day in other services initiated this additional item as essential. After the war, we cut down our magnificent Air Force to a fragment, but no Continental Power followed our example, nor has there been any suggestion of such action since the signing of the Treaty of Locarno. The French have some 140 squadrons, practically all at home, the Italians are well on the way to a force of 100 squadrons. Our Home Defence expansion has only reached a total of twenty Regular and five Special Reserve or auxiliary squadrons.

"To the public, the taxpayers, who realise the probability that they will be the first target at the outset of another war, there is little consolation in knowing that we have a superbly trained air personnel on the ground, but few machines in the air. The consequences of the proposed 'cut' were indicated in the report of the annual meeting of the Rolls-Royce Co. 'The result of any important curtailment of the Air Ministry programme for new aeroplanes and engines must necessarily involve the discharge of a considerable number of workmen who were experienced experts and could not be replaced. This must place the British Empire in a position of danger. Obviously engine-designers could not spend their time and money in bringing out new aero-engines unless they were in receipt of sufficient orders to justify such expenditure.' The Air Force relies on private enterprise for its machines, and as a result the aircraft industry forms as essential a pivot of the scheme of national defence as any combatant part. Further, no other arm is developing so rapidly, nor finds its instruments obsolete so soon, and thus, as Maj. Turner pointed out in these columns yesterday, the progress of design is as vital as the supply of material. If orders are suspended for two or three years, not only must factories be closed down, but experiment also will be cramped, for no firm can afford it, nor will they have any prospect to offer to the engineering brains of the country. Such a policy is even immediately extravagant, for the smaller the orders the higher must be the cost per unit, engine, or machine-



BRISTOLS IN GERMANY : This photograph shows a school machine, fitted with Bristol "Lucifer" engine built by the ARADO Handels Gesellschaft m.b.H., of Warnemunde. The wing bracing is somewhat unusual.

Commercial Flying with Napier engines means safety and reliability—*always*

"SINCE the beginning of 1922 the bulk of the traffic has been carried by the single-engined De Havilland-Napier ten-seaters.

That forced landings have been few and far between, and that no British machine has had to alight in the Channel, is solely due to the wonderful level of reliability of the Napier 'Lion' engine and the excellent system of overhaul and maintenance."

Evening News,
30th Dec., 1925

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The Air-cooled "JAGUAR"

is the most successful engine in the world. Lengthy experience proves that there are fewer involuntary stops with

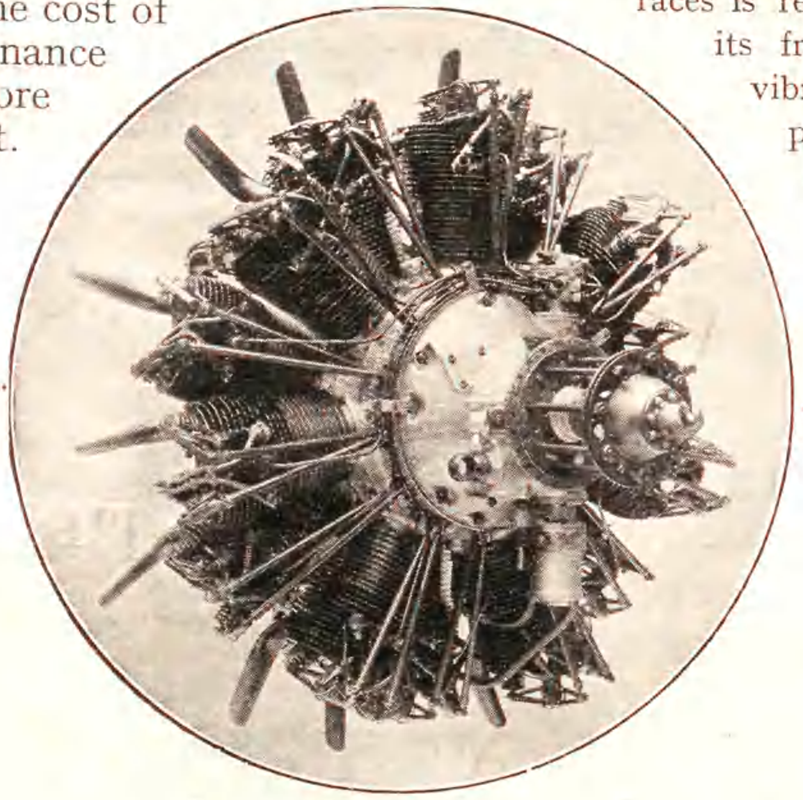
THE "JAGUAR"

than with any other engine. The cost of its maintenance is therefore the lowest.

is the only post-war engine that has figured successfully in the last three King's Cup Races.

THE "JAGUAR"

which made fastest time in the 1923, 1924 and 1925 races is remarkable for its freedom from vibration and low petrol and oil consumption.



The "JAGUAR"

is perfectly cooled under the worst conditions. Alan Cobham, writing in the "Daily Mail" of his London to Cape Town Flight, says:—"We experienced terrific heat in the middle of the day, especially when flying low to photograph the Dam......... The Siddeley Jaguar Air-cooled Engine did not overheat but ran perfectly."

The LYNX is half the JAGUAR and possesses the same high qualities.

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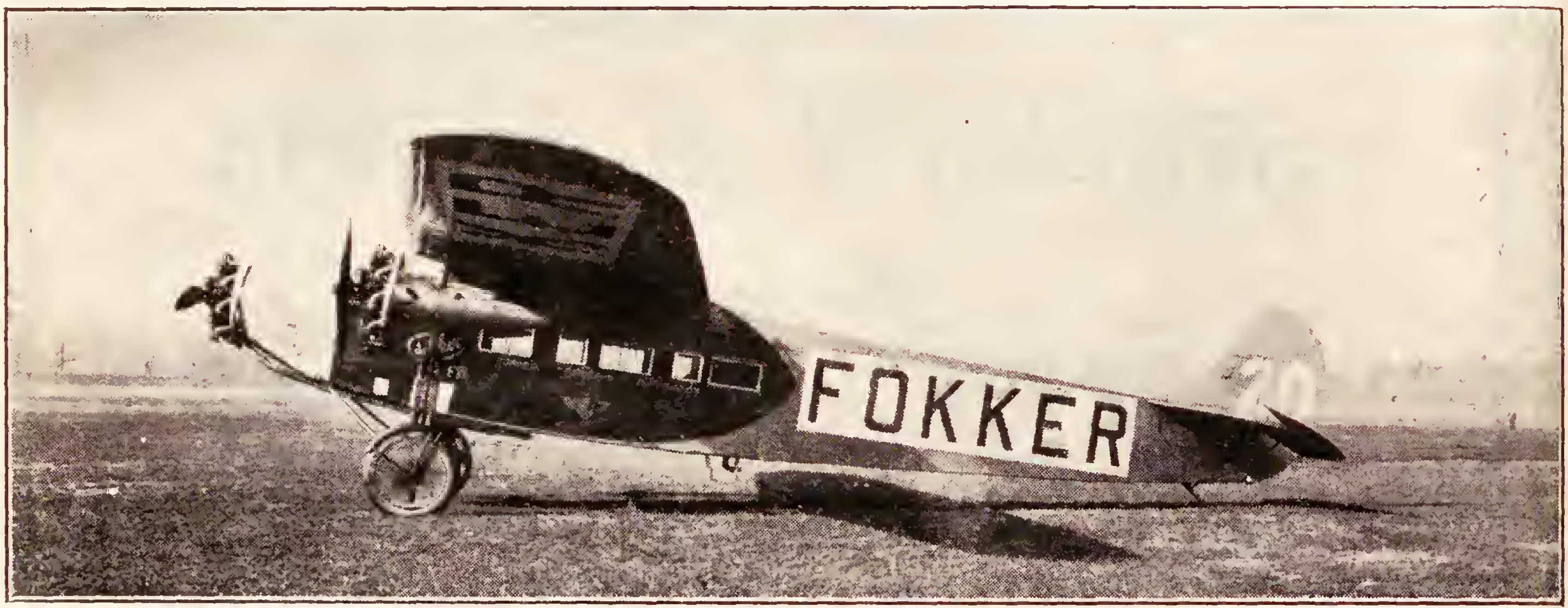

THE FOKKER F VII-3m,

WITH THREE WRIGHT "WHIRLWIND" ENGINES OF 200 H.P. EACH

(Can also be fitted with three Siddeley "LYNX" or other radial engines of equal H.P.),

WILL FLY AND CLIMB ON ANY TWO ENGINES WITH FULL LOAD.

The following remarks are extracted verbatim from the official report issued by the Engineering Division of the Army Air Service, at McCook Field, Dayton, Ohio, on the tests carried out with the Fokker F.VII-3m.

"The airplane returns to a normal level position when left to itself in a side slip or glide."

"There is no tendency to spin at the stalling point or with abrupt use of the controls. It retains controllability at the stalling point. The airplane does not stall of its own accord."

"In a glide it is possible to change direction by the use of the rudder only."

"The ailerons are easy to move at both high and low speeds. The airplane responds readily to the ailerons at all speeds."

"The cockpit is accessible and comfortable. The pilots are protected against the wind. It is unnecessary to wear goggles while flying."

N. V. NEDERLANDSCHE VLIEGTUIGENFABRIEK,

AMSTERDAM - HOLLAND.

The aircraft industry, after almost collapsing after the war, has been built up again—without the lavish subsidies given by foreign Governments—because it was assured of a continuous and clearly-defined air policy. If this sure support is to be removed, the country at least should be warned of the dangers—not only the prolongation of our defencelessness in the air, but the hopelessness of attempting any expansion in an emergency if the foundation is destroyed. Marshal Foch has lent his authority to the view that future wars may be decided by air attack on the civil population and centres of industry, and if this be even a possibility it is essential to guarantee their defence as a first charge before meeting the requirements of the other Services. Their rôles, however important, are secondary in point of time when war breaks out. To reconcile economy with security it would seem essential, not merely to review expenditure, but to review the military values of the various Services under modern conditions, as a step to reconstruction of our scheme of defence and a readjustment of the proportionate expenditure."

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CORRESPONDENCE

The Editor does not hold himself responsible for opinions expressed by correspondents. The names and addresses of the writers, not necessarily for publication must in all cases accompany letters intended for insertion in these columns.

AIRSHIPS IN WAR

[2112] A wordy warfare between author and critic is usually amusing, and therefore I crave a little space for an attempt to add to the gaiety of nations. In his letter which appeared in your issue of January 7, Major Oliver Stewart writes: "If the British Navy can forbid the surface of the sea to hostile carriers, which implies hostile warships (including submarines) it *must be able* to forbid it to raiders and to ensure the safety of the trade routes." The italics are mine.

This argument is a fallacy of the class known to logicians as *non sequitur*. The ability to forbid the surface of the sea to hostile carriers and all that that term implies (the use of the word "surface" rules out submarines), by no means involves the ability to forbid it to raiders. In the late war the British Navy did forbid the surface of the sea to the enemy's main fleets; but a few isolated raiders and one small squadron (the Scharnhorst, Gneisenau and Co.) managed to escape on to the high seas. The same thing is quite likely to happen in future wars. It is an easy matter for the mistress of the seas to arrange for the destruction of the raiders once they have been located; but delay in locating them is expensive in the matter of merchant shipping. The use of airships will be the quickest way of locating the raiders.

In his next paragraph Major Stewart writes: "The British Navy can prevent hostile ships from approaching the scenes of operations; therefore, the British Navy requires airships to prevent hostile ships from approaching the scenes of operations. Read that through quickly three times and its force may become clear."

I have read it through more than three times, both quickly and slowly, and its force has not yet become clear to what I call my intelligence. Perhaps I am not able to read fast enough. If hostile ships do not approach scenes of operations, then what operations, may I ask, take place on those scenes? Raiders certainly do not want to approach the scenes of any operations except their own.

There, Major Stewart, is my Roland for your Oliver.

F. A. de V. Robertson

Hampstead, January 8.

THE NEW SUBSIDY BASIS

[2113] An undesirable feature of the new subsidy arrangements with Imperial Airways, which you have not (I think) touched on, is the premium placed on high engine-power. Maj. Turner has calculated that on a flight between London and Amsterdam a Vickers "Vanguard," with 1,200 h.p. carrying about 4,000 lb. commercial load, will on the new basis earn £73 8*s*. subsidy, while a 240 horse-powered D.H. 50 carrying 930 lb. commercial load will only earn £14 12*s*. subsidy. On these figures the twin-engined machine carries 3·3 lb. commercial load per horse-power, compared with 3·9 lb. carried by the D.H. 50. In other words, the "Vanguard," with only 84·6 per cent. of the "commercial efficiency" of the D.H. 50, has exactly five times the subsidy-earning capacity. Whatever advantage this system may have for Imperial Airways, it cannot but be detrimental to the development of the aeroplane as a commercially paying proposition and seems calculated to encourage inefficiency. We appear to be drifting back to the War days, when the aeroplane was "developed" simply by cramming on more horse-power. The policy of two of the leading light-aeroplane engine firms in increasing the horse-power of their engines from about 24 h.p. to 35 h.p. seems to point to the same tendency.

W. Lockwood March, *Lieut.-Col.*

January 17, 1926

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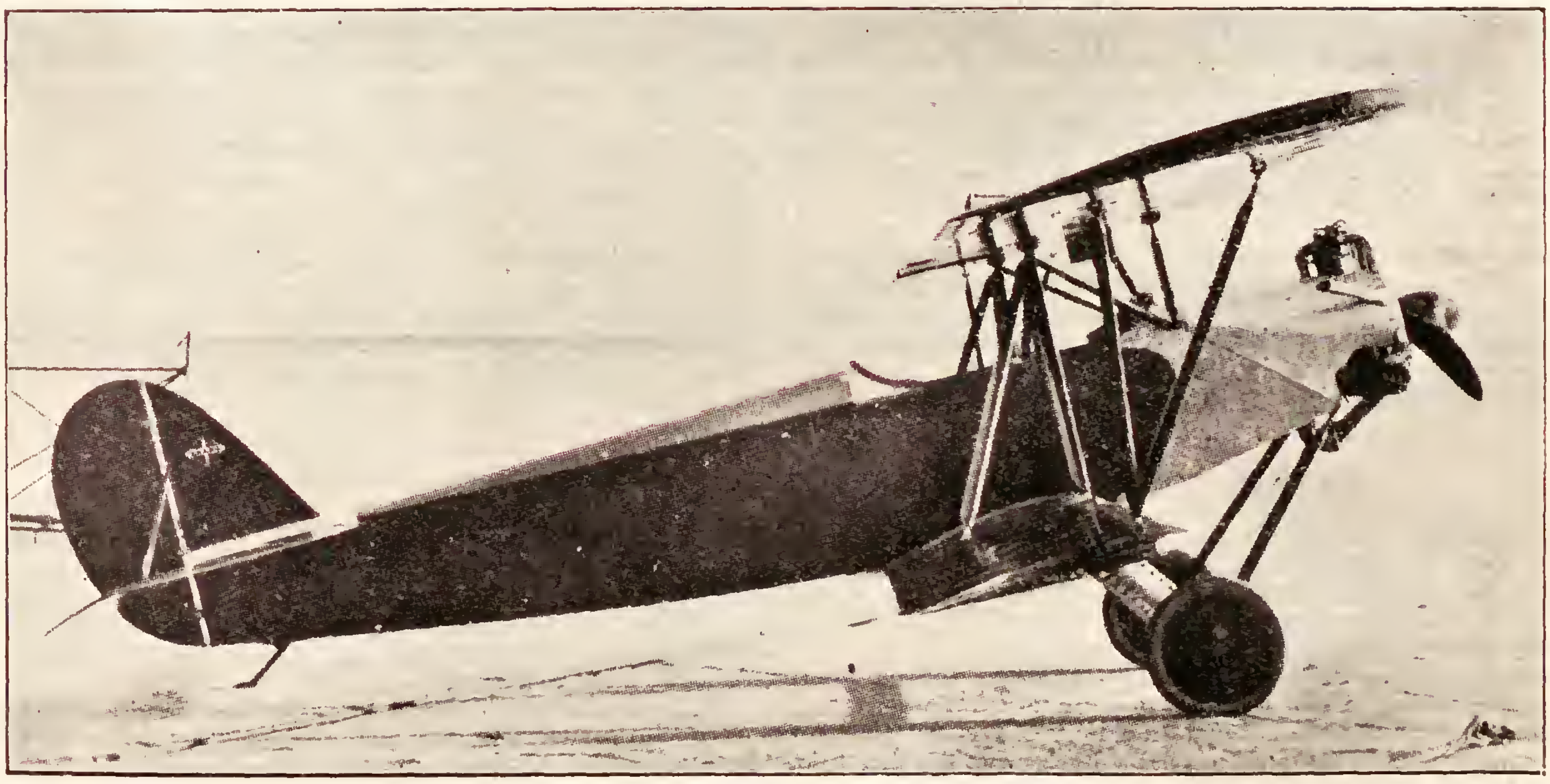

Side view of the ARADO A.R.S.1 with Bristol "Lucifer" engine.

THE ROYAL AERONAUTICAL SOCIETY'S SIXTIETH ANNIVERSARY

LAST week, on Tuesday evening, January 12, the Royal Aeronautical Society held a conversazione in the Aeronautical Section of the Imperial College of Science, to celebrate the sixtieth anniversary of the foundation of the society. A large number of guests, well known in the world of aeronautics, were present, including Sir Samuel Hoare, Secretary of State for Air, Prince Chichibu of Japan, and Foreign Air Attachés. They were received by Air Vice-Marshal Sir Sefton Brancker, Director of Civil Aviation and Chairman of the Council of the Society.

The guests spent a very pleasant time inspecting the many interesting and historic aeronautical exhibits which have their home in the museum, as well as an additional collection of early aeronautical books, prints, manuscripts and early records of the society, all of which are usually housed at the Society's headquarters in Albemarle Street. From these early records of the Society one was able to follow its development, from its inauguration at a meeting held at Argyll Lodge with the Duke of Argyll in the chair on January 12, 1866, up to its present position of being the foremost as well as the oldest aeronautical society in the world.

In the space at our disposal it would be impossible to enumerate all the interesting exhibits which were to be seen on the occasion of last week's gathering, but among the more important links with the past we may mention the following. A model of Montgolfier's hot-air balloon and various relics of famous early balloons, accounts or illustrations of their ascents, gave an insight to the early work of the society which was then mainly devoted to ballooning. Then, for a later period, various items connected with the heavier-than-air side, such as a model of Stringfellow's steam-driven aeroplane, and later still the actual triplane on which Mr. A. V. Roe—the first Englishman to fly—made his first attempts on Lea Marshes.

Among the modern exhibits illustrating the progress of aeronautics was the Reid indicator for testing the "flying aptitude" of pilots, by means of which it is possible to ascertain, graphically, whether a pilot has (*a*) "good hands" for manipulating the joy-stick; (*b*) "good feet" for the rudder bar; (*c*) can at a moment's notice quickly and evenly perform the combined movements of hand and feet.

In welcoming the guests Sir Sefton Brancker said he thought that Sir Samuel Hoare was the best Air Minister this country had ever had. His work in connection with the technical and civil sides of British aviation would bear fruit for years to come. He added that the society was particularly indebted to Sir Samuel for the assistance, to the extent of £250 a year for five years, granted by the Government—a sum which had actually saved the society from going out of existence.

In responding, Sir Samuel Hoare said that he had always thought that the most important matter in connection with his own position was not to get in the way of other people.

The public, he pointed out, was interested in the future of British flying, and his main duty as Air Minister was to give everyone the freest possible chance to develop it. If, at the end of his period of office, British flying had developed, it would be due more to the energy of people inside and outside the Air Ministry than to the particular Minister who held office.

On his own behalf and on that of the Government generally, he was keenly interested in the anniversary and wished to congratulate the society on the invaluable work it had accomplished during the last 60 years. At the time of the society's formation scarcely anyone believed in the future of aviation outside the membership, and even the press was, with the exception of John Delane, the editor of the *Times*, extremely sceptical of the new development.

It was the Aeronautical Society, now the Royal Aeronautical Society, which kept the lamp of progress alight and year by year provided the opportunity, as its records of papers read showed, of discussing almost every problem of flying. Great as the record of the past 60 years had been, he hoped the most useful period of the society's activities had yet to come. He understood from Sir Sefton Brancker that the society was about to extend its activities. It was contemplating the introduction of associate members, men and, he hoped, women, who would not only be scientists, but actually engaged in the daily work of flying. It also contemplated awarding its gold medal to some distinguished aeronautical pioneer. That medal was seldom given, and the names of those who held it showed how great were their services.

The new programme entailed greater financial support that that received during the past few years, and it was satisfactory to note that more than one benefactor had already come forward. He was told that Mr. Scott Paine, had already offered a subscription of £50 a year, and Lord Cowdray, who had rendered innumerable services to British flying, had promised another £50 a year if nine others would follow his example. He sincerely hoped that those nine people would come forward, for one of the difficulties of British aviation had been the extent to which it had hitherto been dependent on the activities of one Government Department. Concluding, Sir Samuel said the Society was a splendid centre for increasing the interest of British citizens in flying, and bringing into the common pool of aviation development more brains and capacity than we could hope to have if they were restricted to the exertions of a Government department.

A short but extremely interesting history of the Society, with special reference to its work during the Great War, was given by Mr. J. E. Hodgson, the Hon. Librarian.

Among those present were:

H.I.H. Prince Chichibu, the Brazilian Ambassador, the Japanese Ambassador, the Swedish Minister, the Swiss Minister, Prince N. M. Arasteh (Persian Chargé d'Affaires), Major B. F. S. Baden-Powell, Professor L. Bairstow, Sir Geoffrey and Lady Butler, Mr. A. Stewart Buckle (president, Society of Engineers), Sir T. A. Coghlan (Agent-General for New South Wales), Sir Joseph Cook (Australian High Commissioner), and Lady Cook, Major H. C. Davidson (U.S. Air Attaché), Sir Fortescue Flannery, Lieut.-Colonel I. A. E. Edwards (Deputy Director of Air Transport), Lord and Lady Gorell, Mr. C. Shirreff Hilton (Deputy Chairman, Air League of the British Empire), the Hon. James Huxham (High Commissioner for Queensland), Mr. J. Howard (Agent-General for Nova Scotia), Sir Samuel and Lady Instone, Colonel Sir Joseph Nall (President, Institute of Transport), Mr. J. S. K. Inskip (President, Cambridge University Aeronautical Society), Sir Frederick Mills, Bt. (President, Iron and Steel Institute), Colonel H. G. Lyons (director of Science Museum), and Mrs. Lyons, Commander the Marquis and Marchioness Komatsu, Lieut.-Colonel J. T. C. Moore-Brabazon, M.P., Lord Montague of Beaulieu, Mr. Handley Page, Sir John and Lady Ridley, Mr. P. F. Rowell (Secretary, Institution of Electrical Engineers), Sir John and Lady Salmond, Commander Baron and Baroness Sanejima, Lieut.-Colonel R. Eccles Snowden (Agent-General for Tasmania), Colonel the Master of Sempill and Mrs. Sempill, Sir Vyell Vyvyan and Lady Vyvyan, Lord Wargrave, Professor W. W. Watts, Mr. H. E. Wimperis (Director of Scientific Research, Air Ministry), Brig.-General Sir S. H. and Lady Wilson, and Mr. T. O. M. Sopwith.

FEDERATION AERONAUTIQUE INTERNATIONALE

THE Committee of the Fédération Aéronautique Internationale met in Paris on Monday, January 11, 1926.

Delegates from thirteen countries attended, the Royal Aero Club being represented by Lieut.-Colonel M. O'Gorman, Major J. S. Buchanan and H. E. Perrin.

Schneider Cup.—France and Italy proposed the carrying of a useful load. This was opposed by Great Britain and America and on a vote being taken it was decided that no modification should be made in the rules for the next race.

The question of the date, which has been fixed for October 24, 1926, was discussed at some length. It was decided that the F.A.I. would raise no objection to the Royal Aero Club forwarding a request to America to postpone the date to 1927.

Gordon-Bennett Balloon Race.—It was decided to hold the race towards the end of May, the exact date being left to the Aero Club of Belgium, the holders.

Tests for Aviators' Certificates.—On the proposal of the Royal Aero Club, it was decided that the tests for Aviators' Certificates should no longer include an obligatory flight of one hour at an altitude of 6,000 ft. The height of 6,000 ft, however, must be attained.

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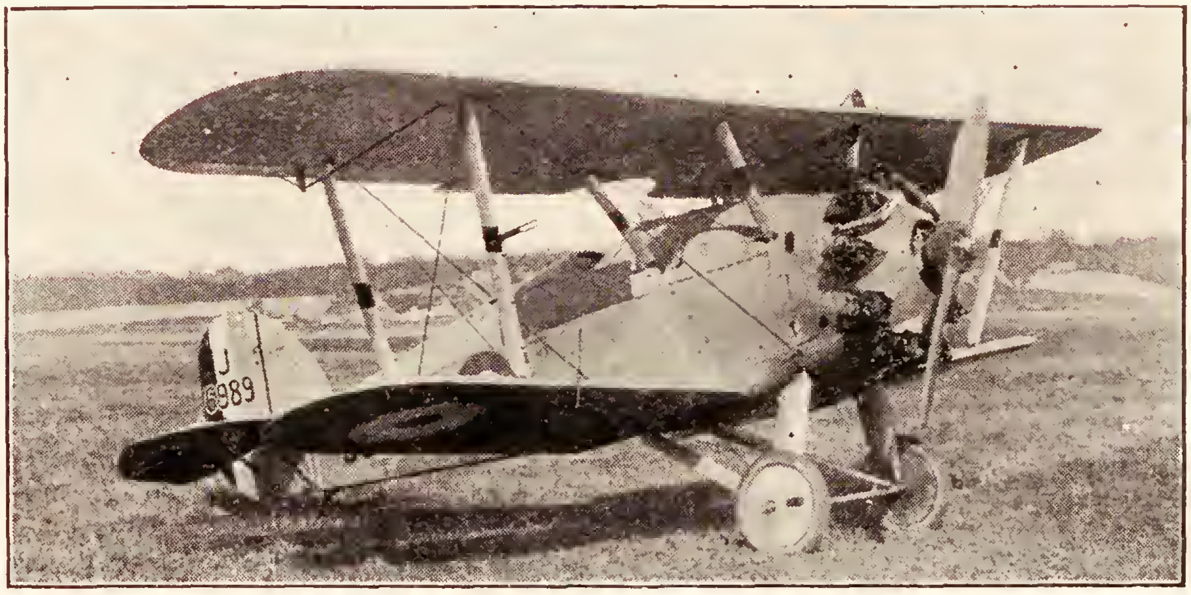

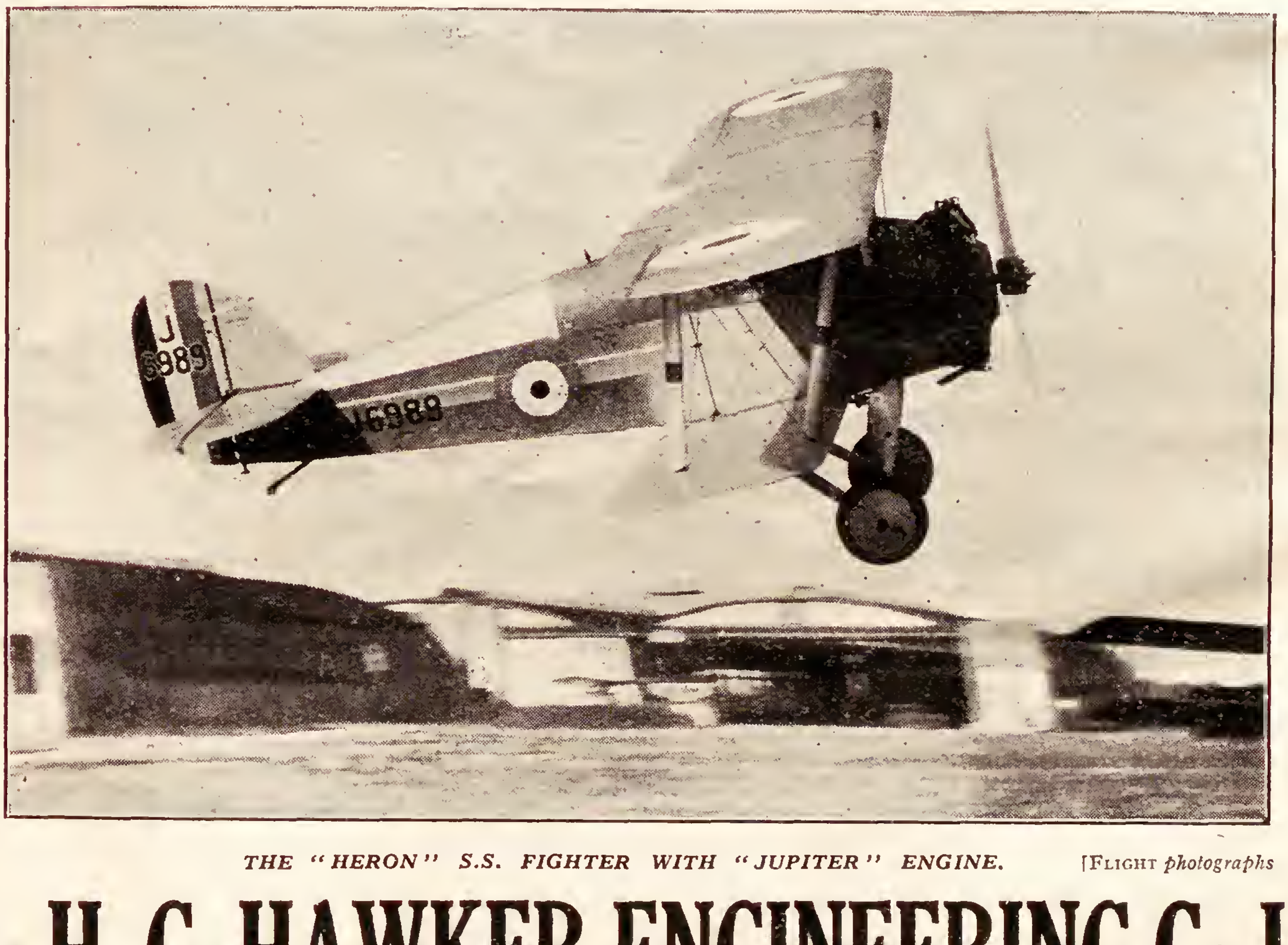

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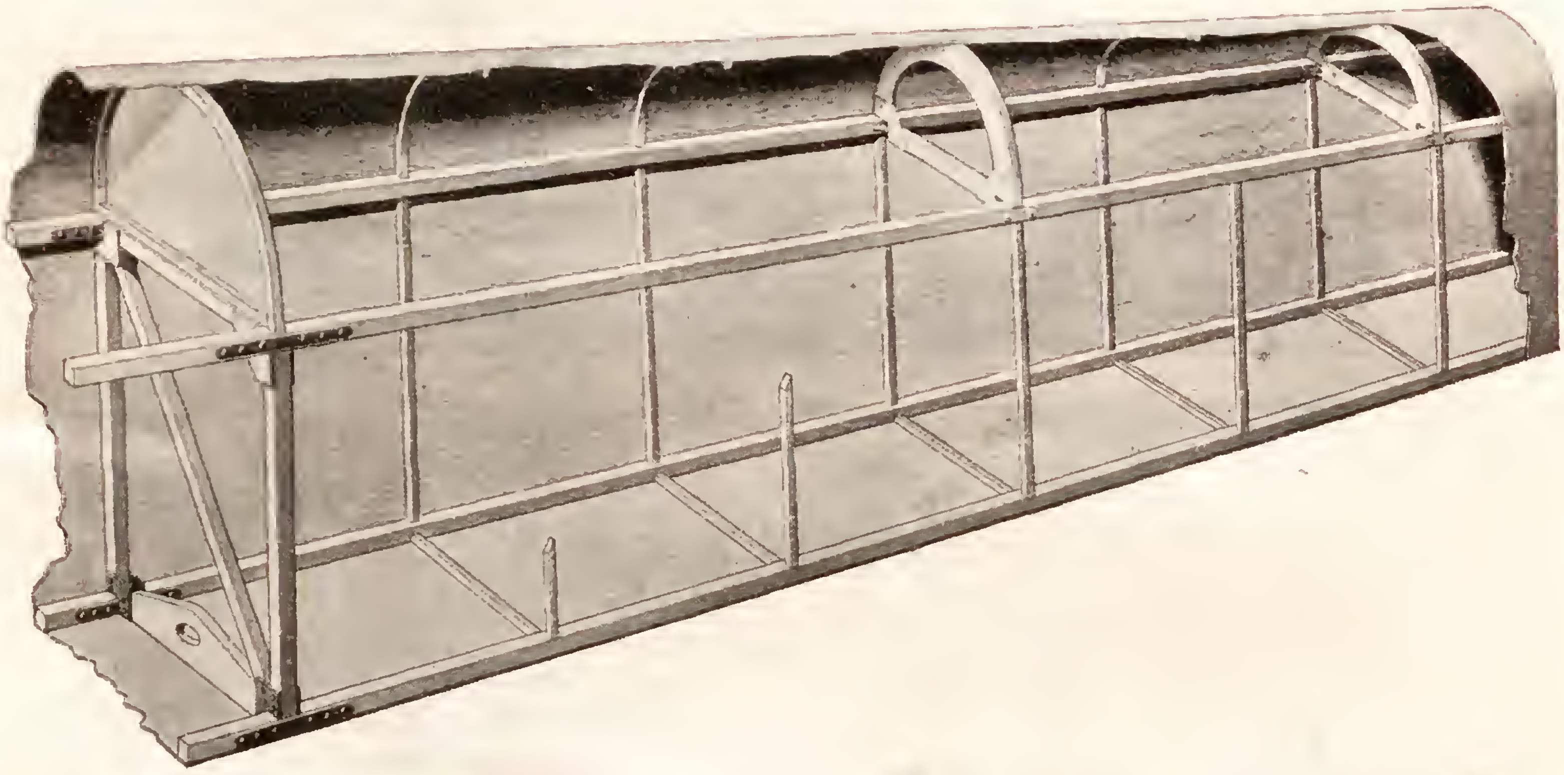

FUSELAGE CONSTRUCTION.

¶ The method of fuselage construction used in the manufacture of all modern de Havilland Aircraft, consisting of three-ply covering on spruce longerons and web-member bracing has been adopted, after exhaustive practical demonstrations of its superiority over forms hitherto employed.

¶ Its chief advantages lie in its rigidity and ability to maintain trim without maintenance or attention—it has been found that fuselages of machines having flown even up to 300,000 miles, upon dismantling for overhaul, have not required the slightest adjustment.

¶ The robustness of de Havilland Fuselages has saved many lives in accidents which would certainly have had fatal results had other forms of construction been involved.

¶ A clean exterior is obtained without extra fairings, although ample facilities are afforded for inspection of working parts.

¶ *A section of the fuselage of the "MOTH" is illustrated above as being typical of the de Havilland system—its reliability and great strength, combined with the ease with which it can be repaired in the event of minor mishaps, render it as suitable for Training as for Military and Commercial purposes.*

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AN AIR-COOLED LIBERTY ENGINE

In the December issue of our American contemporary, *The Slipstream,* there is published a brief account, by Hobert L. Wilson, of an interesting experiment carried out by the Engineering Division of the U.S. Air Services at McCook Field, viz., converting the Liberty engine from a water-cooled into an air-cooled. As this engine is not unknown to many of our readers on this side of the Atlantic we quote the article in question below for their benefit.

There are some thousands of the standard Liberty 12 water-cooled engines in war surplus stocks. These engines have been constantly modified since their construction to bring them up to date. The reliability of the engines is a well-known factor, as evidenced by their successful performance on numerous duration and distance flights, including the Round-the-World Flight. But it remained for the Engineering Division of the U.S. Air Service (McCook Field) to air-cool these engines, thus continuing their life as up-to-date equipment.

The previous development in America of air-cooled engines had been limited to radial engines because of the ease of securing uniform cooling with this arrangement. The air-cooled V-type, however, had its advantages, foremost of which was a decrease in frontal areas—3·1 sq. ft. compared with 8·7 sq. ft. for the nose radiator of the D.H.-4 aeroplane with a water-cooled engine.

The air-cooling of the Liberty engine consisted in the design, construction and test, of air-cooled cylinders assembled on a standard Liberty 12 engine, using overhead camshafts, and a rotary induction system. The new parts consist of a 4⅝ in. diameter piston, its pin, the bushing for the small end of the connecting rod, a cylinder, suitable cowls to catch the air from the propeller and lead it down the Vee to escape between the cylinders, camshaft and housing, and a special wiring manifold.

The cylinder construction is a modification of the Engineering Division Type "J" cylinder which is the basis of all successful, large, air-cooled engines in America. It consists of an aluminium head, screwed and shrunk on a steel barrel, and further held by a steel clamp ring shrunk over the base of the head. The exhaust valves are salt-cooled, and the exhaust is inside the Vee to bring the coolest air over the hottest part of the cylinder head.

Additional modifications of the standard Liberty engine are steel backed bearings for the connecting rods, omission of water pump and the replacement of the oil pump by a special large volume unit. The horse-power of the Liberty air-cooled engine is approximately the same as that of the water-cooled engine, but with the propeller turning at a higher r.p.m., the fuel consumption remains practically the same.

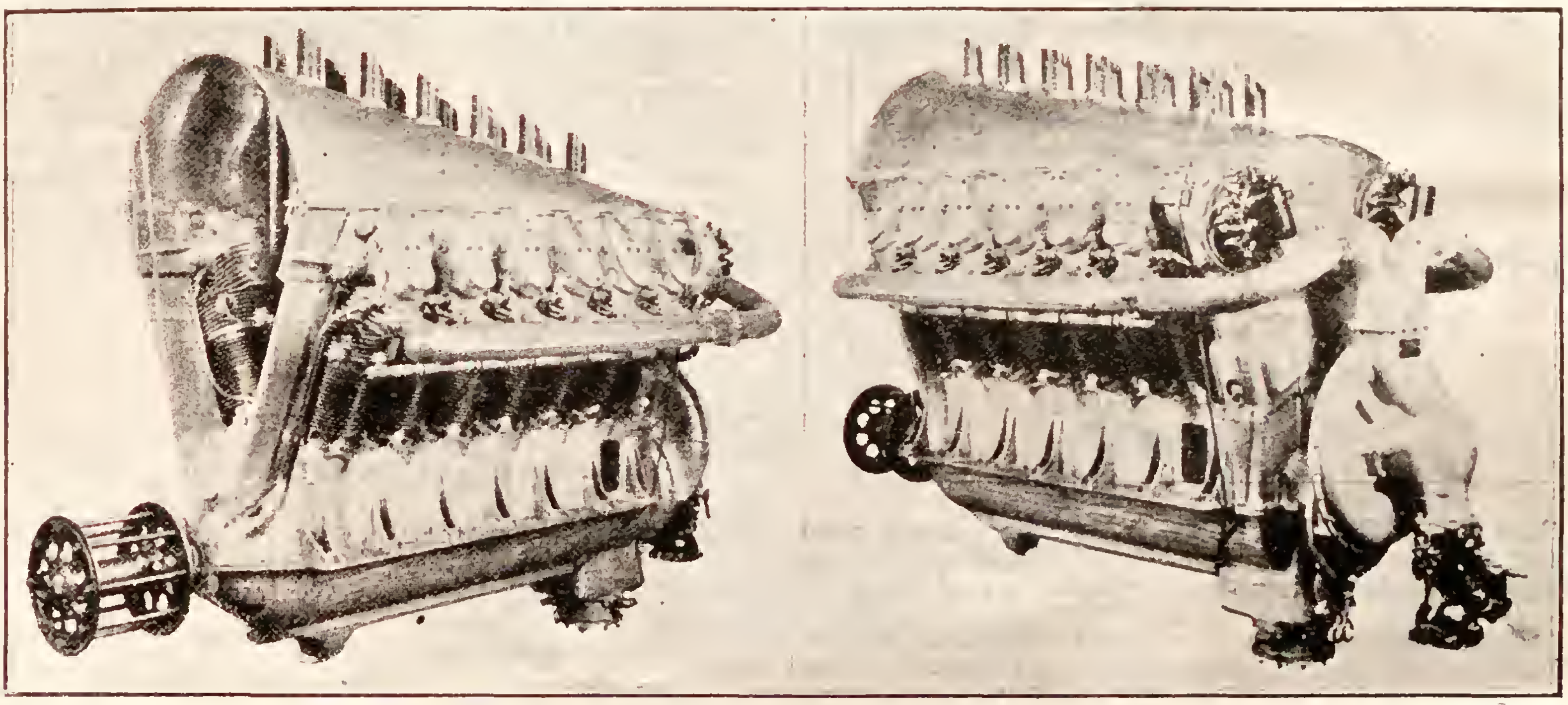
In addition to the decrease in frontal area, particularly on the inverted engine, which permits of a narrow streamline nose cowl, the saving in weight of the air-cooled engine installation over the water-cooled engine installation is considerable as is noted below in the case of the X-CO.6 aeroplane.

The first production model of the air-cooled Liberty engine was installed in the X-CO.6 observation machine and given a flight test. After a few preliminary flights, the machine was flown across country from Dayton to Mitchel Field, Long Island, where it competed in the race for observation 'planes, and was a leading contender in this race until forced down in the last lap by a stoppage in the fuel supply.

The advantages of the inverted air-cooled Liberty engine, installed in an aeroplane as in the case of the X-CO.6 are as follows :—

1. Improved Flying Qualities—
    - (*a*) Reduction of Weight. Weight saved, 141 lbs.
    - (*b*) Lower frontal area and improved streamline shape due to absence of radiator.
    - (*c*) Improved vision due to narrow lines possible around upper portion of nose, while maintaining the thrust line at a desirable height with respect to the centre of gravity of the machine.
    - (*d*) Reduced noise, exhaust stacks low, cleaner to fly, free from oil and carbon.
    - (*e*) Reduced vibration in aeroplane structure because of the use of the rotary induction system which makes the engine run very smoothly.
    - (*f*) Independent of extremes of hot or cold weather and altitude.

2. Reduction of First Cost and Maintenance Cost—
    - (*a*) Simpler engine installation.
    - (*b*) More accessible, cowling lighter, easier to make, to remove and to put on. Valve gear, sparking plugs and carburettor can be reached without climbing on machine, or using a ladder.
    - (*c*) Fuel and oil consumption equal to that of most water-cooled engines.
    - (*d*) Elimination of cooling system with hazards of leaks and freezing and its vulnerability to gun-fire in the case of a military machine.



AN AIR-COOLED LIBERTY ENGINE : Two views of the Liberty 12 aero engine converted from water-cooled to air-cooled by the Engineering Division, U.S.A. Army Air Service, at McCook Field.

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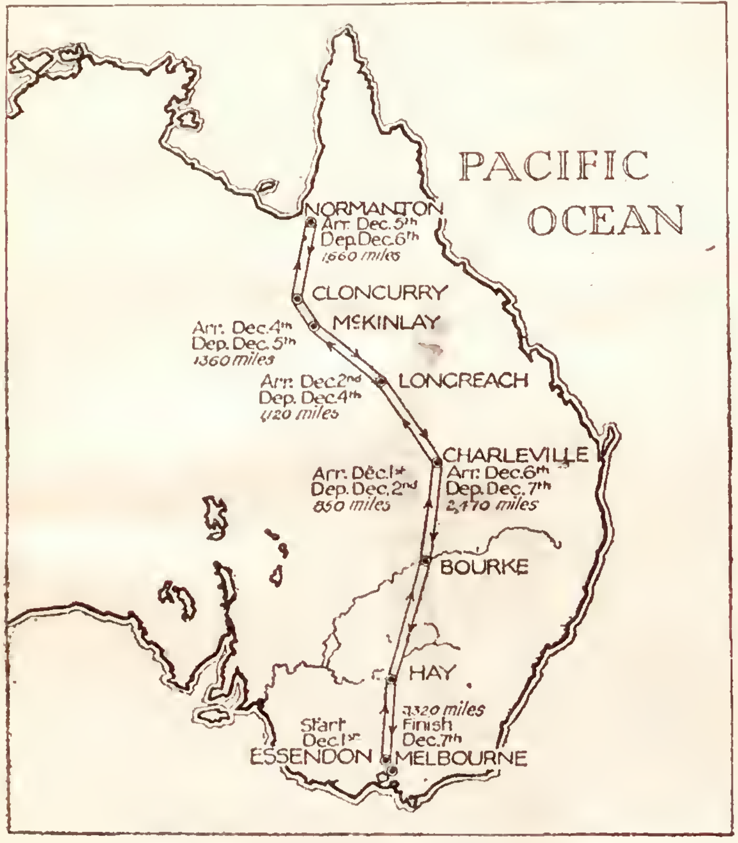
Oslo-Spitzbergen Flight

On January 9 Lieut. Eliassen, accompanied by Dr. Gross, left Oslo in a flying-boat, with the object of flying to Spitzbergen. A snowstorm forced them to descend at Sjoa (175 miles from Oslo), but they resumed their journey on January 11, only to find after 1½ hours that they had gone out of their course. A landing was made at Lesje, and eventually they reached Aandalsnes, where they thoroughly overhauled the machine. On January 16 they set out again for Spitzbergen.

ACROSS AUSTRALIA IN TWO DAYS

Col. Brinsmead's Fine Performance in a D.H. 50

We have just received some brief particulars of a fine flight across Australia and back carried out by Col. Brinsmead, the Controller of Civil Aviation to the Commonwealth Government. The object of the flight was to inspect the air route between Charleville and Cloncurry and to survey a proposed extension of this service northward to Normanton. The outstanding feature of this flight may be said to consist of the fact that the return journey from North to South Australia was accomplished in two days—a journey, which by any other means than aircraft, would occupy not less than three weeks. The section from Cloncurry to Normanton alone, under existing conditions, involves, we understand, about a fortnight's travelling, since there is no direct route between the two places.



ACROSS AUSTRALIA IN TWO DAYS: Sketch map showing the route taken by Col. Brinsmead in his flight from Melbourne to Normanton and back

Col. Brinsmead used the same de Havilland type 50 biplane, with 240 h.p. Siddeley "Puma" engine, in which he made the 7,000 miles circuit of Australia in 22 days—immediately after the machine had been taken from its packing case—during the summer of 1924. The pilot of the machine was Capt. E. J. Jones, M.C., A.F.C., who has accompanied the Controller on all his long flights, and Mr. O. H. Howard accompanied the expedition as engineer.

The first stage of the journey, carried out on December 1 last, was one of 850 miles from Melbourne to Charleville, the southern terminus of the Queensland and Northern Territories Aerial Services route (Charleville-Camooweal). On the next day the flight was continued another 370 miles to Longreach, the Q.A.N.T.A.S. headquarters, when discussions with Mr. Hudson Fysh, the managing director, occupied the following day, December 3.

Proceeding on December 4 they got as far as McKinlay, a station 240 miles north-west of Longreach, where they spent the night. The last stage of the outward journey to Normanton, via Cloncurry (the present northern terminus of the route) was covered on December 5.

The homeward journey, which is tersely described in the report of the flight as "uneventful," was made in two days—810 miles from Normanton to Charleville being flown on December 6 and on the following day 850 miles from Charleville to Melbourne, bringing the total mileage to 3,320, which was completed in 37 hours 25 min. flying time.

It is of interest to note that the Queensland and Northern Territory Aerial Service Co. has acquired the manufacturing rights from the de Havilland Aircraft Co., entitling them to build under licence D.H.50 machines for use on their services.

While on the subject of flying in Australia, perhaps the following figures (obtained from the Air Ministry) of the traffic carried by the Australian air lines during the month of August last and the period from January to August of last year, may be of interest :—

Route	Period 1925	Machine Mileage	Paying Passengers	Letters Carried	Goods Carried lbs.
Perth–Derby* (1,442 miles)	Aug. ... Jan.–Aug.	12,861 105,723	102 631	22,911 145,018	973 4,809
Charleville–Camooweal* (825 miles)	Aug. ... Jan.–Aug.	7,673 55,261	78 761	1,939 11,886	945 7,504
Adelaide–Cootamundra* (578 miles) Broken Hill–Mildura† (189 miles) Melbourne–Hay† (233 miles)	July 21–Aug. 31	18,286	26	1,872	—
Total all routes ...	Jan.–Aug.	179,270	1,418	158,776	12,313

* Weekly in each direction. † Twice weekly in each direction.

D.H.50 machines are also employed on the Adelaide-Cootamundra, etc., services, which are operated by the Larkin Aircraft Supply Co., Ltd.

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LIGHT 'PLANE CLUB DOINGS

London Aeroplane Club

The fog during the week has curtailed the flying and with only one machine available the flying time was 7 hours 55 minutes.

The following members had flying instruction :—R. C. Brighton, R. L. Preston, Mrs. Atkey, R. V. Banks, W. Hay, G. Wallcousins, G. Quirk, D. Kittell, N. Jones, A. P. Hunt, V. H. Doree, A. R. Ogston.

Solo flights were made by Mrs. Eliott-Lynn, G. N. Warwick, and G. H. Craig.

The accident to G-EBLU has turned out a serious matter, as it means practically a complete write-off of the aeroplane. Immediate steps are being taken to replace the machine.

The inaugural dance of the London Aeroplane Club was held at the Suffolk galleries on January 13, under the patronage of Sir Philip Sassoon. The profits from this dance were to be devoted to the furnishing of a club room at the aerodrome, but the Committee decided that as it was more important to make it a success as a social function than as a financial undertaking all efforts were accordingly made in that direction.

Among the 200 present were strong representations from the R.A.F. The Army, the Navy, the Air Ministry, the Royal Aero Club, the Air League, the Aircraft Industry, the Press, and the other light aeroplane clubs.

A substantial amount of money was realised, details of which can be obtained from the Hon. Secretary, Dance Committee, and to which it is hoped numerous contributions will be added.

During the evening Mr. Santos Casani, an old R.F.C. pilot, and Miss Josi Lennard performed some graceful exhibition dances.

The Lancashire Aero Club

Flying took place on Wednesday, Friday, Saturday and Sunday, except for Wednesday hard frost and mist have prevailed. Mr. Cantrill and Mr. Scholes gave dual instruction to: H. Hardy, 1 hour 45 mins.; A. Goodyear, 35 mins.; W. Colley, 1 hour 5 mins.; D. Tummers, 35 mins.; H. Stern, 35 mins.; P. Michelson, 20 mins.; A. Parker, 35 mins.; J. Leeming, 1 hour 5 mins.; S. Crabtree, 40 mins.; R. Williams, 25 mins.; M. Lacayo, 35 mins.

Solo flights of 45 mins. by J. Cantrill.

Total dual 8 hours 15 mins., tests occupied 45 mins. Total time flown, 9 hours 45 mins.

The enthusiasts who use the L.P.W. will be glad to hear a new engine has arrived and is to be fitted shortly. This will drive the "Prop" direct without gearing. It is proposed to raise the engine and to take 4 in. off the height of the front skid, At present the skid is inclined to "dig in" if the tail is too high. The optimists predict that the new engine will be easy to start, and Mr. Dyson is confident of higher speeds—even uphill.

The Newcastle-upon-Tyne Aero Club

Flying report for week ending Sunday, January 17, 1926 :—The weather has been unfavourable throughout the week, with snow and fog almost every day. No flying was possible on Tuesday or Thursday.

On Wednesday both Mr. W. M. MacKay and Mr. W. T. Walton carried out the figure of eight tests for their licences, each flying for half-an-hour, but there was never any possibility of them attempting the height tests on account of bad visibility.

On the same day, L.Y. "Bernicia" proceeded to her birth-place, Stag Lane, per the Tyne-Tees steamer *Bernicia*. The latter looked more stately than ever as she proceeded down the river, and appeared to be inwardly rather proud of her part in, for a time, removing her rival in the transport business of the distruct.

Mrs. R. N. Thompson and Mrs. J. A. Somerville (honorary members) each

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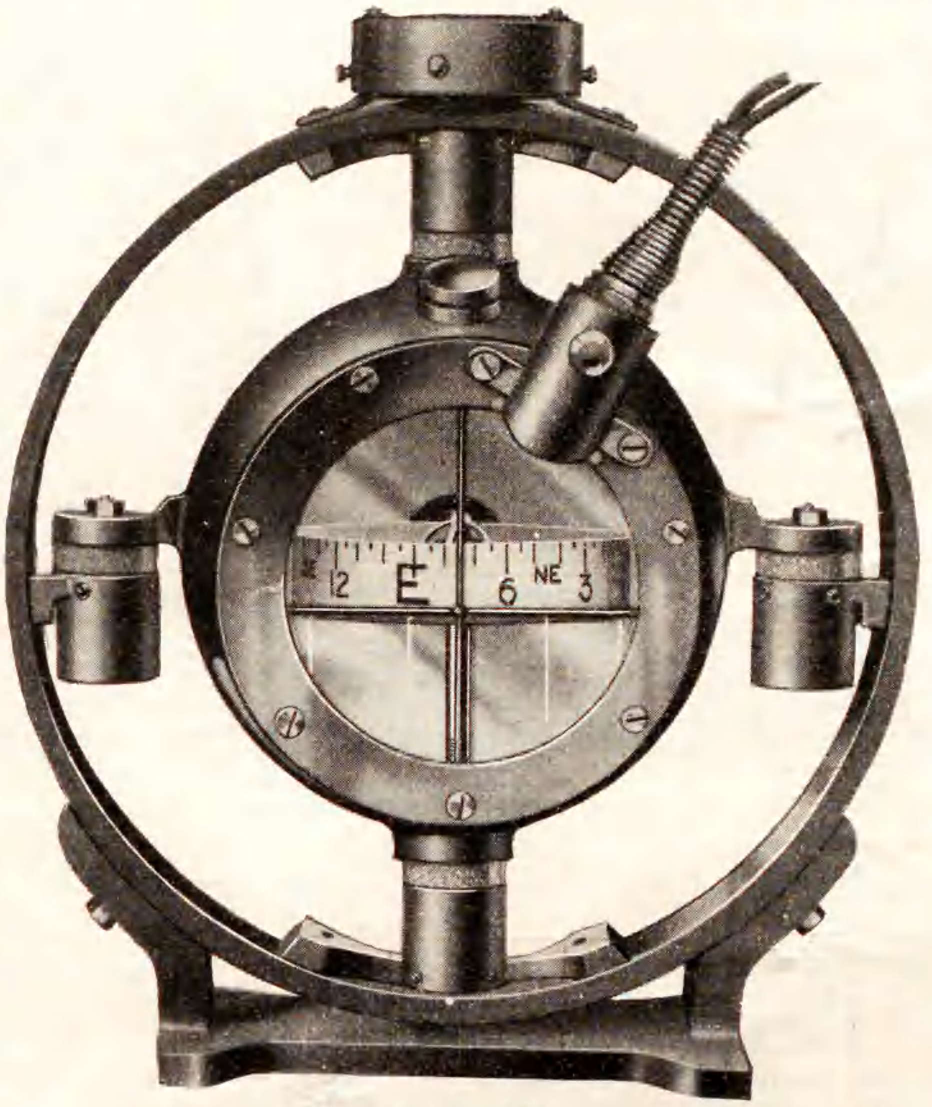

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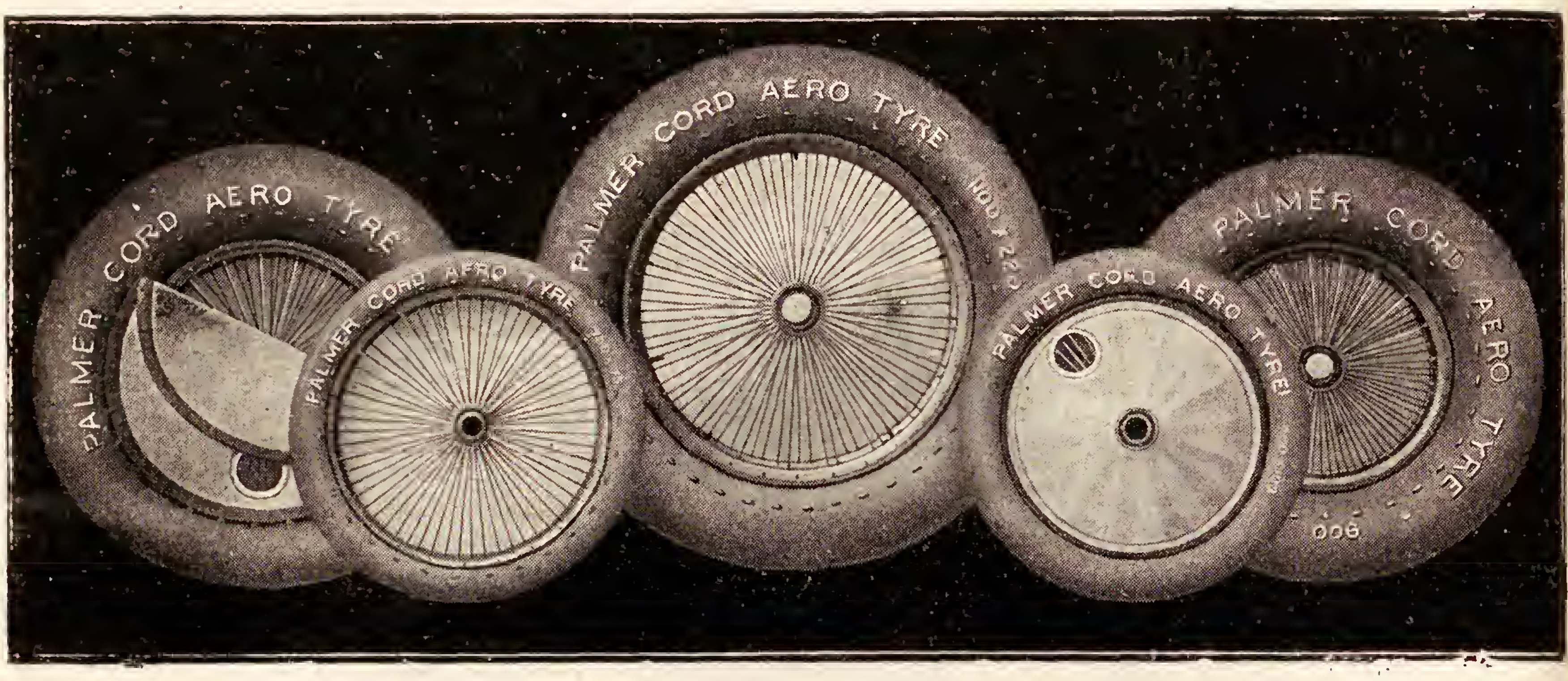

STANDARD SIZES:

Tyre Size	Wheel No.	Hub Length	Hub Bore	Track Line
		m/m	m/m	m/m
375 × 55	168	111.12	25.4	Central
300 × 60	16	111.12	25.4	Central
450 × 60	30	89.	31.75	Central
"	172	130.	38.09	Central
575 × 60	21	160.	28.	Central
"	186	120.	34.92	Central
"	190	150.	38.09	Central
650 × 65	78	178.	44.45	132/46
"	79	178.	44.45	Central
"	100	178.	38.09	132/46
"	101	178.	31.75	132/46
600 × 75	21	160.	28.	Central
"	186	120.	34.92	Central
"	190	150.	38.09	Central
700 × 75	78	178.	44.45	132/46
"	79	178.	44.45	Central
"	100	178.	38.09	132/46
"	101	178.	31.75	132/46
700 × 100	77	178.	44.45	132/46
"	92	185.	55.	135/50
"	95	185.	55.	Central
"	99	178.	38.89	132/46

Tyre Size	Wheel No.	Hub Length	Hub Bore	Track Line
		m/m	m/m	m/m
700 × 100	112	150.	38.09	Central
"	176	178.	44.45	Central
"	179	178.	55.	132/46
650 × 125	119	178.	55.	132/46
"	147	178.	55.	Central
"	188	120.	34.92	Central
750 × 125	77	178.	44.45	132/46
"	92	185.	55.	135/50
"	95	185.	55.	Central
"	99	178.	38.89	132/46
"	112	150.	38.09	Central
"	176	178.	44.45	Central
"	179	178.	55.	132/46
800 × 150	161*	185.	55.	135/50
"	162*	185.	55.	Central
"	163*	185.	66.67	135/50
"	169†	185.	55.	135/50
"	177	185.	55.	135/50
"	183	185.	55.	Central
"	211*	185.	60.32	135/50
1000 × 150	167	185.	55.	125/60
"	174	250.	80.	Central
"	182	185.	55.	Central

Tyre Size	Wheel No.	Hub Length	Hub Bore	Track Line
		m/m	m/m	m/m
1000 × 150	187	220.	66.67	Central
"	201	185.	60.32	125/60
"	210	185.	60.32	Central
1000 × 180	148	220.	80.	Central
"	149	185.	55.	Central
"	155	220.	66.67	Central
"	166	185.	55.	125/60
900 × 200	107	185.	55.	Central
"	108	185.	55.	125/60
"	128	220.	66.67	Central
"	137	250.	80.	Central
"	157	185.	80.	Central
"	202	185.	60.32	Central
1100 × 220	134	220.	66.67	Central
"	136	250.	80.	Central
975 × 225	192	185.	60.32	Central
1250 × 250	133	250.	80.	Central
"	154	304.8	101.6	Central
1500 × 300	115	304.8	101.6	Central
"	126	304.8	152.4	Central
1750 × 300	139	400.	152.4	Central
"	191	350.	150.3	Central

* *Wheels Nos. 161, 162, 163 and 211 are of stronger type than the other wheels for 800 × 150 tyres.* † *Wheel No. 169 is fitted with Ball Bearings.*
Grease gun equipment is a standard fitting on all wheels of 700 × 75 and upwards.

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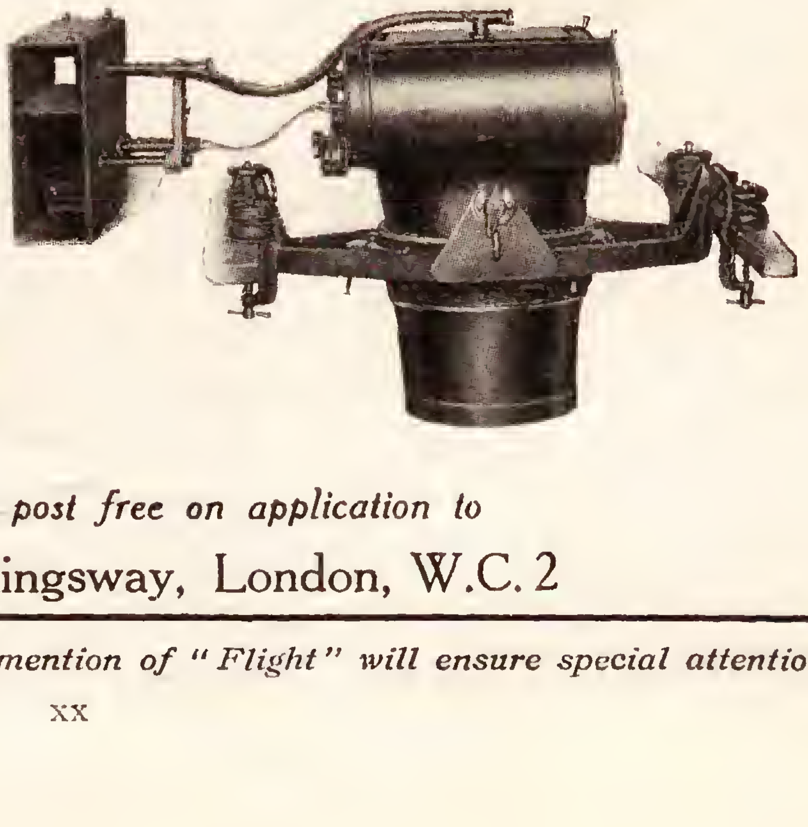

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had 15-minute flights with Major Packman on Saturday, and on Monday Miss Parkin had a 7-minute joy-ride.

Mr. P. Forsyth Heppell took Mr. F. C. Bulman for a 30-minute flight on Saturday. Mr. R. N. Thompson had a 30-minute solo flight.

On Sunday Mr. N. S. Todd flew for half-an-hour with Mr. G. H. Twine as passenger. Mr. Twine had expressed a wish to have a real joy-ride, as, during his dual instructional flights, he is always too busy with his training to be able to study the countryside. Mr. Thompson made two solo flights totalling one hour on Sunday.

The following members had secondary dual instruction under Major Packman during the week :—

Mr. MacKay (50 mins.), Mr. Walton (30 mins.), Mr. Irving (1 hr. 18 mins.).

Dual instruction flights were as follows :—

Mr. A. E. George (30 mins. Skating takes up Mr. George's leisure, and very little is seen of him while the ice lasts, and this accounts for the small amount of flying he has put in since the real winter began), Miss C. R. Leathart (65 mins., two flights), Mr. Twine (38 mins.), Mr. C. G. Bates (15 mins.), Mr. Somerville (2 hrs. 15 mins.), Mr. L. Smith (30 mins.), Mr. A. D. Bruce (30 mins.), Mr. C. Thompson (30 mins.).

Weather tests of 15 minutes completed 13 hrs. 18 mins. for the week, all. of course, on L.X. "Novocastria."

The second monthly whist drive, held at the Clubhouse on Wednesday, the 13th, was very successful, and the company of members and friends spent a very happy evening. The ladies' prize was presented by Mrs. R. N. Thompson. and was won by Miss L. Skelton. Mr. R. N. Thompson was first among the gentlemen, but returned his prize for offer at the next drive.

Capt. J. H. Boyd disposed of a large number of bogus lottery tickets, sold in aid of a very worthy local charity, and mixed his salesmanship with a lot of mirth-provoking suggestions.

A motoring member relates that, on approaching the ground on his first landing, he instinctively put his hand down to put on the "hand brake," and found the starting handle (of the "Moth," of course). No one cared to inquire whether he managed to reduce the landing speed of the machine or not in this way.

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THE ROYAL AIR FORCE

London Gazette, January 12, 1926

General Duties Branch.

The follg. Flight Cadets having successfully passed through the R.A.F. Cadet College, Cranwell, are granted permanent commns. as Pilot Officers, with effect from and with seniority of Dec. 16, 1925 :—C. M. Heard, H. G. Wisher, H. D. Spreckley, E. B. Steedman, V. O. Eyre, W. H. Merton, T. G. Pike, P. J. Stapleton, A. W. B. Hale, E. L. S. Ward, P. de C. F. Smith, A. L. Holden, R. F. Shenton, G. N. Pilcher, H. W. Charnock, H. F. G. Southey, H. W. Pearson-Rogers, E. B. Webb, A. R. Leslie-Melville, P. W. Lowe-Holmes, D. W. R. Ryley, J. B. M. Wallis, A. P. Bett, L. H. Anness, and J. V. Yonge.

The follg. are granted permanent commns. in the ranks stated (Jan. 1) :—FLIGHT LTS.—A R. Jones and W. J. Seward. FLYING OFFRS.—L. G. Nixon, O. B. Swain.

The follg. Pilot Offrs. are promoted to rank of Flying Offr. (Dec. 15, 1925) :—E. A. H. Fisher; H. R. Lowry. Wing Cmmdr. T. G. Hetherington, C.B.E. is placed on h.p. scale B (Jan. 14).

The follg. are placed on the Retd. List at their own request :—Flight Lt. W. A. Skeate (Jan. 6); Observer Offr. H. J. White (Jan. 9); Flight Lt. C. E. Wardle (Jan. 13); Flying Offr. F. W. Barkley (Lt., Indian Army, retd.) resigns his short serv. commn. (Jan. 12). The follg. Flying Offrs. relinquish their short serv. commns. on account of ill-health (Jan. 12) :—A. S. M. Meyrick-Jones; T. J. Woods. Flying Offr. F. J. C. Rybot (Lt. R. A.) relinquishes his temp. commn. on return to Army duty (Jan. 9).

Stores Branch.

Pilot Offr. St. J. F. Wintour is confirmed in his appt. in the Stores Bch. and is promoted to rank of Flying Offr. (Nov. 25, 1925); Flight Lt. K. A. Smith is placed on the Retd. List on account of ill-health (Jan. 13).

Accountant Branch.

The following Flying Offrs. are granted permt. commns. in the rank stated (Jan. 13) :—J. Charles; M. H. Luker. The following Pilot Offrs. on probatio are confirmed in rank and are promoted to the rank of Flying Offr. (Nov. 10, 1925 :)—K. E. M. Holmes; J. M. Murray. The follg. Pilot Offrs. on probation are confirmed in rank and are promoted to the rank of Flying Offr. with effect from Dec. 3, 1925, and with seny. on Nov. 10, 1925 :—S. W. Hill, R. W. Collinson.

Medical Branch.

J. D'I. Rear is granted a short serv. commn. as a Flying Offr. for three years on the Active List, with effect from and with seny. of Jan. 1, and is secd. for emplmt. at Royal Sea Bathing Hosp., Margate, with effect from that date. Flying Offr. H. G. Maguire resigns his short serv. commn. (Jan. 13).

Reserve of Air Force Officers.

T. Buchanan is granted a commn. in Cl. A, Gen. Duties Bch., as a Flying Offr. on probation (Jan. 12); Flying Offr. H. W. G. Trotman is transfd. from Cl. B to Cl. C (Sept. 3, 1925); Pilot Offr. G. B. Shillaker is transfd. from Cl. A to Cl. C (Jan. 12); the commn. of Pilot Offr. on probation R. C. H. Joy is terminated on cessation of duty (Dec. 15, 1925).

London Gazette, January 15, 1926

General Duties Branch

The following are granted Short Service commns. as Pilot Officers on probation with effect from and with seniority of the dates indicated :—

N. J. Anderson, G. M. Beattie, J. E. A. Binnie, T. J. L. Bradley, L. S. T. Brown, N. R. Buckle, W. B. Causer, G. R. T. Clarke, M. A. Cowan, P. H. Danger, A. P. de W. de Wytt, C. E. Eckersley-Maslin, C. L. Edwards, G. H. Godwin, W. E. W. Grieve, H. R. Hawker, J. E. McC. Henderson, D. J. R. Hylton, H. E. Milton, P. A. Moritz, A. W. H. Nelson, E. G. Olson, J. H. Pool, A. A. Radclyffe, H. T. A. Silcox, L. M. Timmins, L. S. Tindall, C. Warsow, C. D. G. Welch (Sec. Lieut., H.A.C., Inft., T.A.); Jan. 6. F. H. Bailey; Jan. 7.

Pilot Officer on probation F. Priestman is confirmed in rank; Dec. 2, 1925. Wing Commander A. J. Miley, O.B.E., is seconded for two years' duty with the Chilean Navy; Jan. 19.

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified :—

General Duties Branch

Flight Lieutenants.—W. E. G. Mann, D.F.C., J. T. Paine. and B. A. S. Lewin, to Electrical and Wireless Sch., Flowerdown; 10.1.26. R. J. Read, to No. 6 Group Headquarters, Kenley; 8.1.26.

Flying Officers.—W. C. Yale, C. F. Caunter, C. G. C. Sullivan, J. E. G. Thomas, and R. R. Bennett, to Electrical and Wireless Sch., Flowerdown; 10.1.26. E. A. Scales, to R.A.F. Depot; 22.1.26. R. A. P. Roberts, to No. 31 Sqdn., India; 6.1.26. A. P. K. Hattersley, to No. 24 Sqdn., Kenley on appointment to a Short Service Commn.; 11.1.26.

Pilot Officers.—R. H. Holmes, to Electrical and Wireless Sch., Flowerdown; 10.1.26. The following Pilot Officers are posted to R.A.F. Depot, on appointment to Short Service Commns (on probation), pending posting overseas, with effect from 6.1.26 :—N. J. Anderson, G. M. Beattie, J. E. A. Binnie, T. J. L. Bradley, L. S. T. Brown, N. R. Buckle, W. B. Causer, G. R. T. Clarke, M. A. Cowan, P. H. Danger, A. P. De Woulf De Wytt, C. E. Eckersley-Maslin, C. L. Edwards, G. H. Godwin, W. E. W. Grieve, H. R. Hawker, J. E. McC. Henderson, D. J. R. Hylton, H. E. Milton, P. A. Moritz, A. W. H. Nelson, E. G. Olson, J. H. Pool, A. A. Radclyffe, H. T. A. Silcox, L. M. Timmins, L. S. Tindall, C. Warsow, and C. D. G. Welch. F. H. Bailey to R.A.F. Depot on appointment to Short Service Commn. (on probation), pending posting overseas, with effect from 7.1.26. J. H. C. Purvis and L. A. Walsh, to remain at No. 2 Flying Training Sch., Digby, instead of to No. 25 Sqdn., as previously notified The following Pilot Officers are posted on appointment to Permanent Commns. from R.A.F. Cadet College with effect from 16.12.25 :—C. M. Heard, to No. 2 Sqdn., Manston; H. G. Wisher and P. de C. Festing-Smith, to No. 11 Sqdn., Netheravon; H. D. Spreckley, to No. 12 Sqdn., Andover; E. B. Steedman and A. W. B. Hale, to No. 25 Sqdn., Hawkinge; V. O. Eyre, to No. 56 Sqdn., Biggin Hill; W. H. Merton, A. P. Bett, and L. H. Anness, to No. 7 Sqdn., Bircham Newton; T. G. Pike, to No. 56 Sqdn., Biggin Hill; P. J. Stapleton, G. N. Pilcher, and A. R. Leslie-Melville, to No. 100 Sqdn., Spittlegate; E. L. S. Ward, to No. 24 Sqdn., Kenley; A. L. Holden, H. W. Charnock, and J. B. M. Wallis, to No. 32 Sqdn., Kenley; R. F. Shenton and H. F. G. Southey, to R.A.F. Base, Calshot; H. W. Pearson-Rogers, to No. 13 Sqdn., Andover; E. B. Webb, to No. 4 Sqdn., S. Farnborough; P. W. Lowe-Holmes and D. W. R. Ryley, to No. 39 Sqdn., Spittlegate; J. V. Yonge, to No. 16 Sqdn., Old Sarum.

Stores Branch

Flying Officer.—P. H. Wynne-Burt to No. 3 Stores Depot, Milton; 9.1.26.

Medical Branch

Flying Officers.—L. I. Hyder and J. Magner, M.B., to Research Lab. and Med. Officers' School of Instruction, on appointment to Short Service Commn., for short course; 6.1 26

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U.S. Aviation and Dollars

THE U.S. House of Representatives Appropriation Committee has recommended an expenditure on naval aviation of $18,674,000 or nearly £3,735,000. This is an increase of $3,693,000 over current funds, of which $9,662,000 is to be applied to new aircraft and equipment. During the next ten years American aeronautics will be assisted by a fund of $2,500,000 (£500,000) established by Mr. Daniel Guggenheim, the multi-millionaire copper-king, who last year gave $500,000 (£100,000) to New York University for the establishment of a school of aeronautics. Oh, for a few British Guggenheims !

Full Scale Experiments.

THE paper read before the Institution of Aeronautical Engineers by Mr. C Howarth, on January 12, dealt with Some Aspects of Full-Scale Experiments. As the title indicates, the paper was of a technical character, and does not lend itself to summarising. As space does not permit of giving the paper in full, we must refer readers desiring to obtain a copy to the Minutes of Proceedings of the Inst. Ae. E., in which the paper will be published in full, as well as a report of the ensuing discussion.

Care and Maintenance of Tools.

WE would remind our readers that it is on Tuesday, January 26, that Lieut. N. A. Olechnovitch, M.E., will read his paper on The Care and Maintenance of Tools as an Important Factor in Workshop Routine before the Institution of Aeronautical Engineers. The meeting will be held in the Lecture Room of the Junior Institution of Engineers, 39, Victoria Street, Westminster, S.W.1, and will commence at 6.30 p.m. and the reading of the paper will be followed by discussion.

SOCIETY OF MODEL AERONAUTICAL ENGINEERS

On Tuesday, January 12, before a large gathering of members at the Central Y.M.C.A., Mr. W. E. Evans gave a lecture on "Model Aeroplane Propellers." After emphasising the importance of the propeller, or more strictly speaking, the airscrew, of an aeroplane and the necessity of drawing a complete design of same to suit the weight and flying speed of the model to ensure good flights, Mr. Evans proceeded to design a propeller to specification laid down in the rules for the recent propeller competition. This being very clearly and simply done, practical operations in forming the wood block, testing pitch angles, and finally balancing, were demonstrated. Laminated blocks were essential if correct pitch angles were to be depended upon for any length of time. A specimen laminated propeller 12 in. in diameter was shown with pitch angles O.K. after being in use for four years. This concluded the first part of the lecture, the second part followed immediately, and was even more instructive. The subject was "Testing Model Propellers for Static Thrust." The apparatus used for the tests was exhibited, and consisted of a small electric motor to which was attached a revolution indicator, these being mounted on a base-board which, when in use, is suspended by four fine piano wires from the ceiling of a room. A needle pointer below the baseboard registers the static thrust in ounces and fractions of an ounce on a calibrated scale fixed on a table. The suspension method, together with the slip stream of the propeller travelling away from the apparatus, eliminates all friction. The electric motor and revolution indicator are an improvement upon Mr. Evans's propeller-testing apparatus, which was in use by the Society four years ago when the power was obtained from a compressed-air container. Still further improvements in the machine are contemplated.

Many propellers, nearly all of 10 in. diameter, this having been found the most suitable size for the motor, but with different pitches and blade areas, were shown, with accompanying graphs recording static thrust at various speeds, including a variable pitch propeller with symmetrical blades, a three-bladed propeller, and a four-bladed one. The best graphs indicated thrusts of over 7 oz. at 2,500 revs., an important point being the fact that the maximum blade width had to be not less than $1\frac{1}{8}$ in., and not more than $1\frac{3}{16}$ in., any excess either way causing the thrust to drop.

Another important point not previously realised by most of the members was evident from all the graphs without exception, was that when the speed of the motor was doubled more than three times the thrust was obtained. The highest maximum thrust, 8 oz., was given by a three-bladed propeller, the pitch of which was equal to the diameter, viz., 10 in. The power absorbed by this propeller was only slightly more than that of a two-bladed propeller of same pitch and blade width, whilst an extra 1-oz. thrust was registered, the maximum revs. being 2,500 and 2,750 respectively for the full output of the motor.

The four-bladed propeller gave only 1,800 revs., with a maximum thrust of 6½ oz. It was apparent, however, that this thrust is comparatively good for the number of revs. The graphs all showed the same characteristic curve and gave members food for thought as to how they were to maintain their durations of flight with a rubber motor and at the same time increase the speed of their propellers.

On January 26, at 7.30 p.m., there will be an ordinary meeting at the Y.M.C.A. Agenda as follows:—(1) Arrangement of programme for 1926. (2) Question of reducing subscriptions. (3) A Club Journal (edited by W. E. Evans). (4) Fuselage formula.

B. K. Johnson,
Technical Secretary.

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Commercial Aviation in Japan

The Japanese Government has been asked for an appropriation of 2,500,000 yen for the fiscal year 1925 for the purpose of extending the air service between Japan and the Asiatic continent, the Aerial Transportation Co. to receive a subsidy of 500,000 yen, and 2,000,000 yen being used to establish an air service between Osaka and Shanghai, and between Tokyo and Dairen.

Royal Aeronautical Society's Lectures

Major J. S. Buchanan, A.F.R.Ae.S., will give a lecture this (Thursday) evening before the society on "The Schneider Cup Race, 1925." The next meeting will be the joint one with the Institution of Automobile Engineers (Inst.A.E. and *not* Inst. Ae.E. as, through a slip of the pen, it appeared in our diary of forthcoming events) at the Royal Society of Arts, on February 4.

IMPORTS AND EXPORTS, 1924-1925

Aeroplanes, airships, balloons and parts thereof (not shown separately before 1910). For 1910 and 1911 figures see "Flight" for January 25, 1912; for 1912 and 1913. see "Flight" for January 17, 1914; for 1914, see "Flight" for January 15, 1915; for 1915, see "Flight" for January 13, 1916; for 1916, see "Flight" for January 11, 1917; for 1917, see "Flight" for January 24, 1918; for 1918, see "Flight" for January 16, 1919; for 1919, see "Flight" for January 22, 1920; for 1920, see "Flight" for January 13, 1921; for 1921, see "Flight" for January 19, 1922; for 1922 see "Flight" for January 18, 1923; for 1923, see "Flight" for January 17, 1924; and for 1924, see "Flight" for January 22, 1925.

	Imports.		Exports.		Re-Exports.	
	1924.	1925.	1924.	1925.	1924.	1925.
	£	£	£	£	£	£
Jan. ..	2,213	3,546	52,239	83,728	2,219	291
Feb. ..	920	985	26,349	85,639	335	20
Mar.	11,381	—	34,113	56,881	509	9,355
Apr. ..	373	321	56,998	78,041	6,014	6,732
May ..	3,426	560	125,138	74,844	4,162	15,278
June..	1,219	190	87,629	71,009	2,115	667
July ..	1,510	184	179,292	159,262	2,708	870
Aug...	687	469	247,982	113,054	950	—
Sept.	4,383	1,224	67,749	111,237	641	213
Oct. ..	2,715	460	143,512	114,563	3,743	855
Nov...	2,349	837	100,505	84,163	1,007	2,314
Dec...	108	1,806	90,172	104,745	24	19,004
	31,284	10,582	1,210,104	1,137,166	20,698	55,599

⁂

PUBLICATIONS RECEIVED

Report No. 214.—Wing Spar Stress Charts and Wing Truss Proportions. By E. P. Warner. *No.* 217.—Preliminary Wing Model Tests in the Variable Density Wind Tunnel of the National Advisory Committee for Aeronautics. By Max M. Munk. *No.* 218.—Standard Atmosphere—Tables and Data. By W. S. Diehl. U.S. National Advisory Committee for Aeronautics, Washington, D.C., U.S.A.

Canadian Patent Office Record. Vol. LIII, No. 51. *December* 22, 1925. The Canadian Patent Office, Ottawa, Canada. Price 25 cents.

⁂

AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations: Cyl. = cylinder; i.c. = internal combustion: m. = motor. The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

APPLIED FOR IN 1924.

Published January 21, 1926

21,768. De Havilland Aircraft Co., Ltd., and A. E. Haig. Aerofoils. (244,813.)

22,545. Douglas Motors, Ltd., and S. L. Bailey. Pistons. (244,829.)

22,806. Sperry Gyroscope Co. H Gyroscopic navigational apparatus. (244,843.)

25,660. J. Trnka. Driving-gear for propellers and engine valve-gear of aircraft. (244,873.)

28,539. H. O. Short. Sheet-metal hulls for flying-boats and seaplanes (244,898.)

30,613. T. M. Barlow and F. Duncanson. Floats for seaplanes, etc. (244,911).

APPLIED FOR IN 1925.

Published January 21, 1926.

13,214. F. Siegrist. Direction-indicators. (244,994.)

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Fairey Aviation Co., Hayes, Middlesex.
Hayes 136-7-8.
The Gloucestershire Aircraft Co., Ltd., Sunningend Works, Cheltenham.
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Cheltenham 1161-2-3-4; "Glosaircra, Cheltenham."
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34160; "Pander."
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Short Bros. (Rochester and Bedford), Ltd., Seaplane Works, Rochester, Kent.
Chatham 627; "Seaplanes," Rochester.
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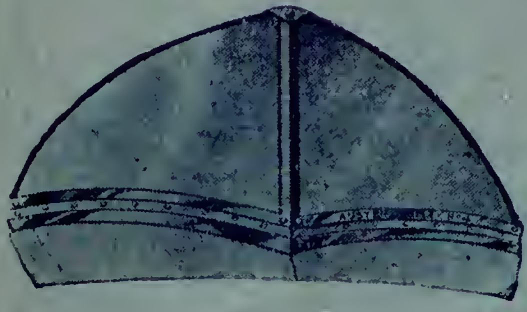

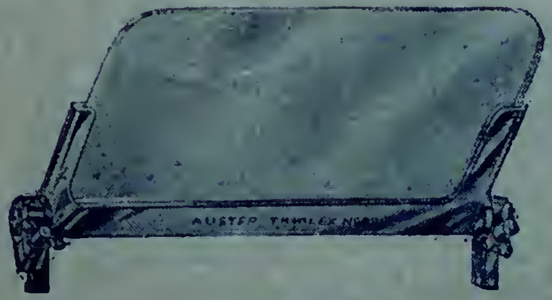

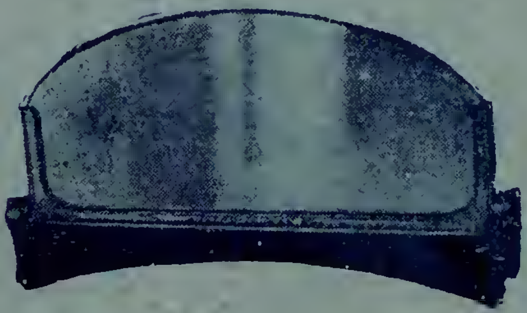

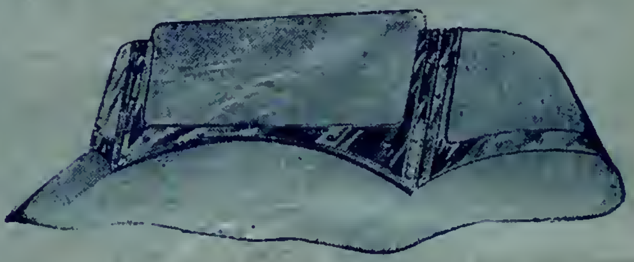

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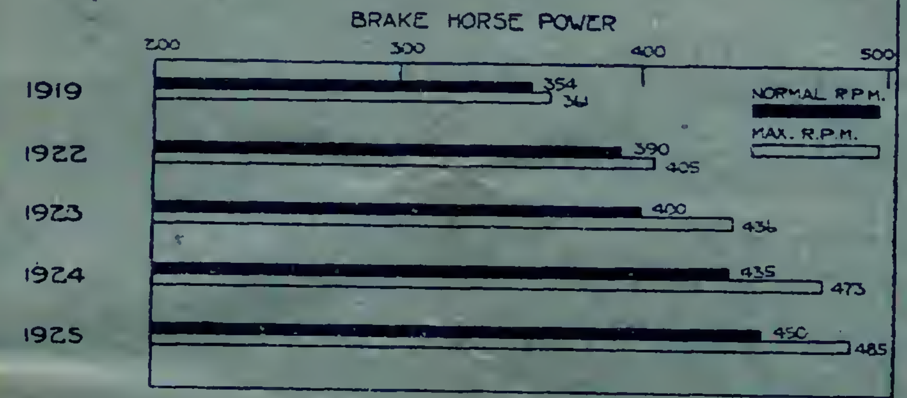

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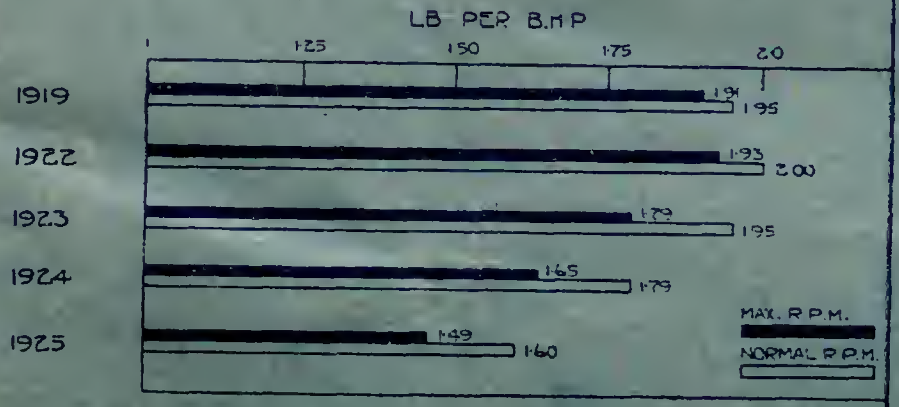

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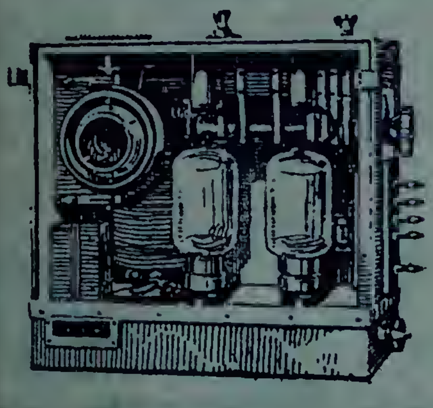

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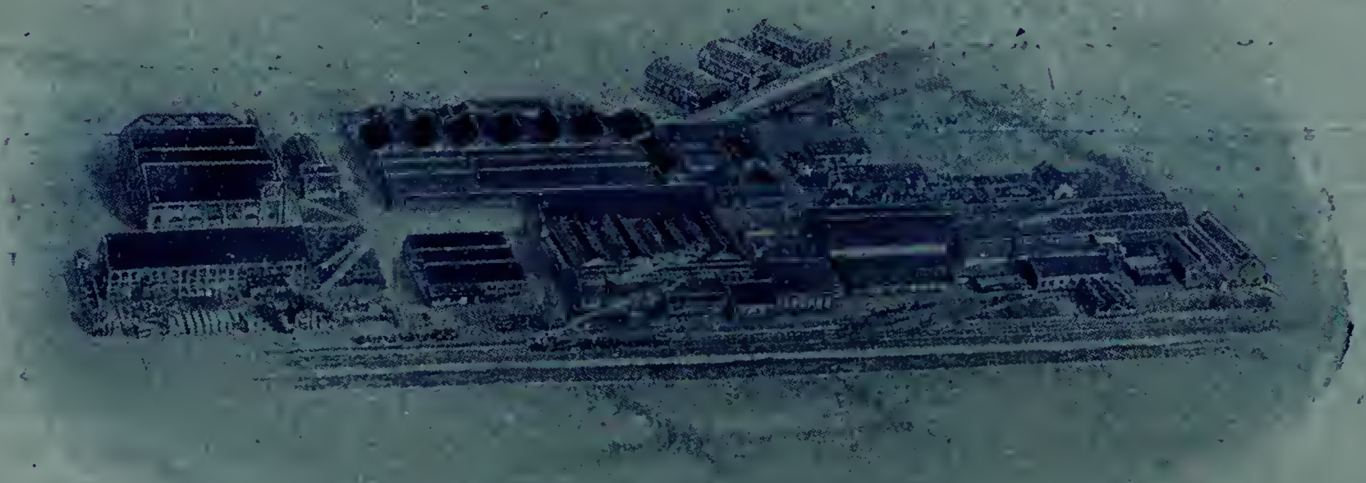

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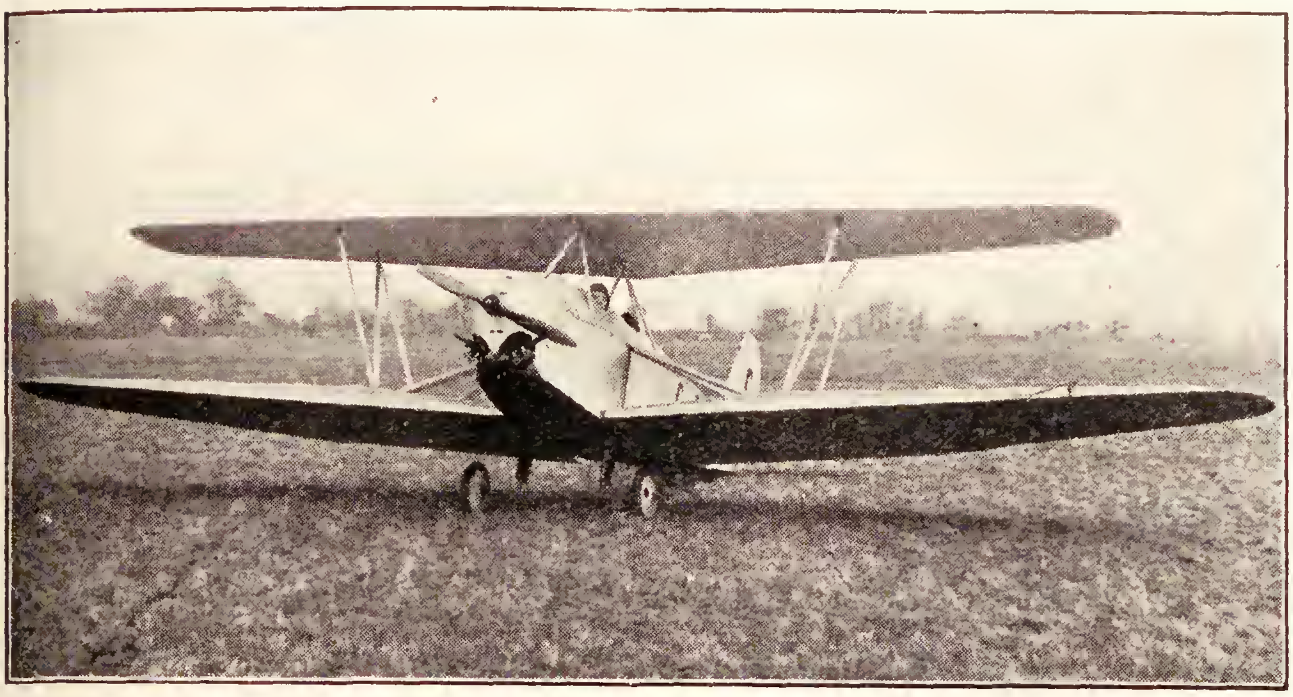

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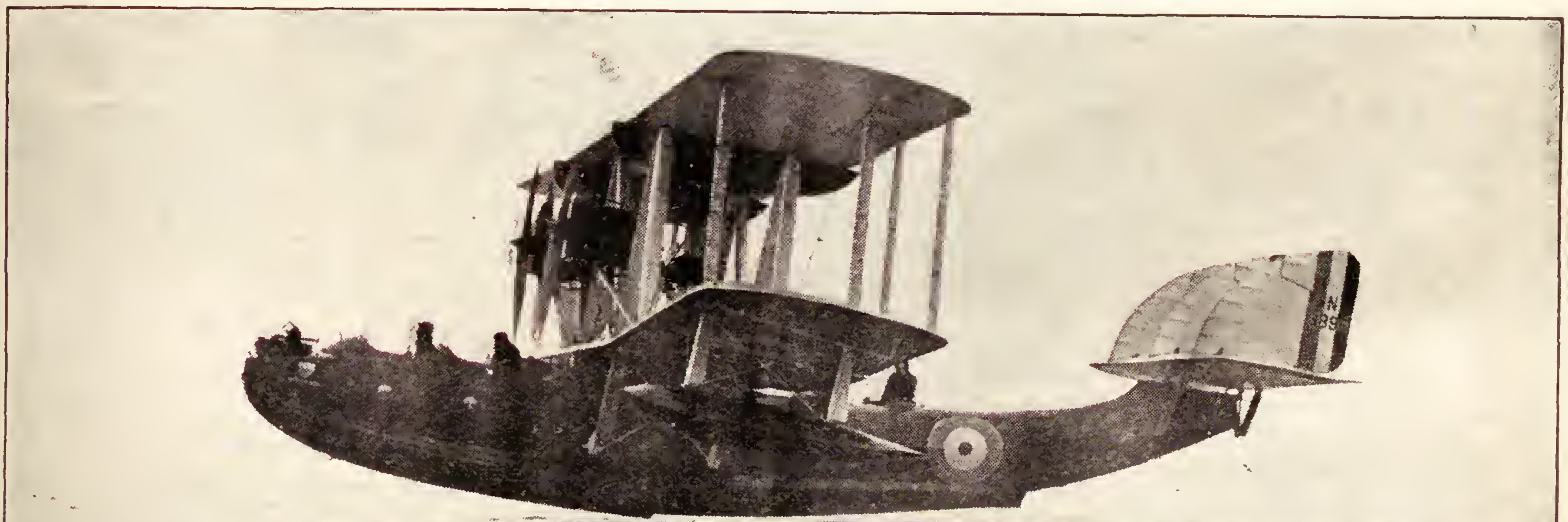

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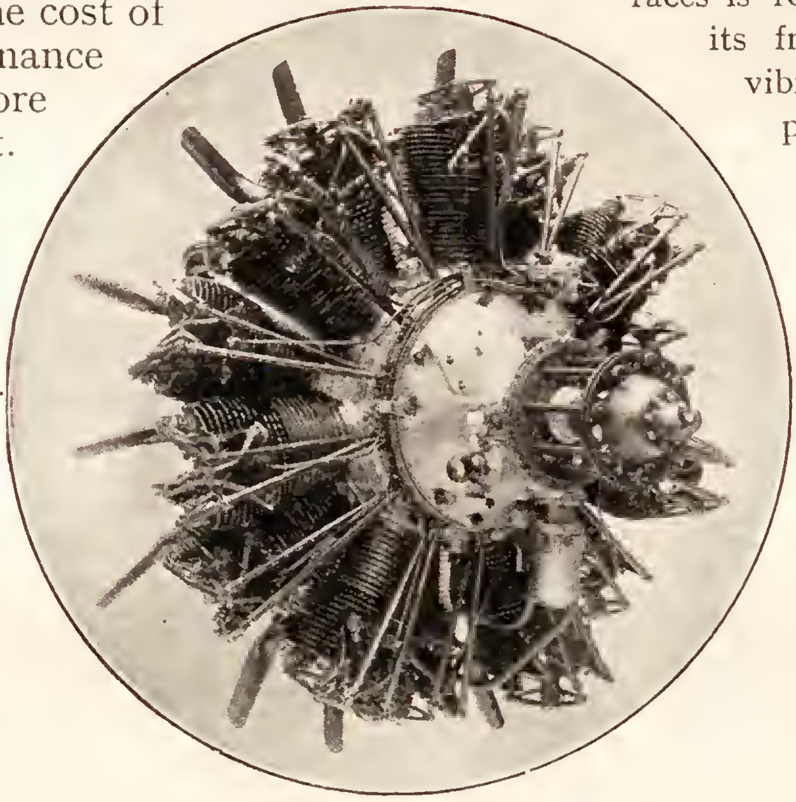

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CONTENTS

Editorial Comment PAGE
And The Aircraft Engineer ... 41
The Auxiliary Air Force ... 42
A Flying-Boat on Wheels. The Albatros L.72 ... 43
Royal Aero Club Official Notices ... 45
Royal Aero Club Third Monthly House Dinner ... 45
Light 'Plane Club Doings ... 47
The Aircraft Engineer ... 48*a*
World's Records ... 49
Air Ministry Notices ... 50
Civil Aviation in Ireland ... 50
Schneider Cup Race. By Maj. J. S. Buchanan ... 51
Security in the Air ... 54
Royal Air Force ... 55
R.A.F. Intelligence ... 55
Personals ... 55
Correspondence ... 56

DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:—

1926	
Feb. 4	Joint Meeting of R.Ae.S. and Inst.A.E. at R. Soc. of Arts. Mr. C. L. Lawrance, "American Aircraft Engine Development."
Feb. 9	Informal Meeting, Inst.Ae.E.
Feb. 25	Mr. A. J. Cobham. "Long-Distance Aeroplane Flights," before R.Ae.S.
Mar. 4	Maj. G. H. Scott. "Development of Airship Mooring," before R.Ae.S.
Mar. 9	Mr. O. E. Simmonds, M.A., A.F.R.Ae.S., M.I.Ae.S. "The Development of Civil Marine Aircraft," before Inst.Ae.E.
Mar. 18	Flight-Lieut. H. Cooch. "Landing Aeroplanes in Fog," before R.Ae.S.
April 13	Mr. S. H. Evans, B.Sc. "The Performance of Modern Aircraft—with special reference to the Variable Wing," before Inst.Ae.E.
April 15	Capt. G. T. R. Hill. "The Tailless Aeroplane," before R.Ae.S.
April 21	Inst.Ae.E. visit to Messrs. D. Napier and Son, Acton.

EDITORIAL COMMENT.

And The Aircraft Engineer

COMMENCING with this week's issue of FLIGHT, we publish the first of what will, we hope, be a long series of monthly supplements dealing with the more technical aspects of aviation, and emphasising THE AIRCRAFT ENGINEER, our sub-title, which, as our readers know, has formed part of the title of FLIGHT for a number of years. As all interested in the subject are aware, there is in existence a wealth of data on aerodynamic problems and phenomena, and a perhaps somewhat smaller amount of literature on structural design. In addition, we have two excellent societies in the Royal Aeronautical Society and the Institution of Aeronautical Engineers, at both of which are read, at fairly frequent and regular intervals, papers dealing with various aspects of the art and science of flying.

At first glance it might appear that there was little scope for elaborating subjects relating to the technical side of aeronautics. Yet we have felt, and we believe the great majority of our readers will agree with us, that a useful purpose can be served by the issue of technical supplements to FLIGHT such as that which we present to our readers this week.

Concerning the vast amount of data available on aerodynamic subjects, it can be said that, generally speaking, far more data exist than can be made practical use of in the everyday work of designing aircraft, and that it is in the application of such data, in the sorting out and evaluation of the enormous amount of information in existence, that the difficulty lies. How much of such information is reliable, how much is immediately applicable to full-size aircraft, what correction factors must be applied, and so forth. In the main it rests with the practical aircraft designer to use his own judgment in these matters, and consequently it is, in the end, the practical man who has to make use of the data provided by the scientist. By obtaining the co-operation of a number of well-known British aircraft designers we hope to publish, in THE AIRCRAFT ENGINEER section of FLIGHT, articles dealing with the personal and practical experience of each, the value of which to other designers cannot very well be estimated, but which cannot fail to be of interest and assistance.

Concerning existing societies and institutions, it is not felt that by collating technical subjects once a month in a supplement we shall be in the slightest degree interfering with their usefulness, nor overlap to any considerable extent the excellent work done by them. Rather do we think this section will be found to supplement them, and that, by appealing to a wider circle, will assist in creating a keener interest in the technical side of aviation, with consequent increase in membership of the societies. The number of people who are in a position to attend lectures is necessarily limited, whereas a technical supplement to FLIGHT reaches thousands of people at home and abroad who are interested in the subject but who, for personal or geographical reasons, cannot attend the meetings of a technical society or institution. Then there is another aspect of the question. There are, to our personal knowledge, a large number of technical men who find difficulty in speaking in public, and whose voice is, consequently, seldom or ever heard in discussions. In the case of our engineering section such will be able to take part, by letters for the Correspondence columns of FLIGHT, in a discussion of the articles contributed to the monthly supplement, and the result of their knowledge and experience will thus become available in cases where they would be likely to remain dumb in a verbal discussion. It is intended to throw the Correspondence columns of FLIGHT open every week to discussion of articles that have appeared in the engineering supplement, as by doing this we can conserve more space in the necessarily limited number of pages which we can afford to give to the monthly technical section.

Concerning the first issue of this section we need say little. The supplement will speak for itself, and must be judged entirely on its merits. We have been extremely fortunate in securing the whole-hearted co-operation, in the form of signed articles, by such well-known men in the aircraft industry as Mr. Handley Page, Maj. Green, Mr. Sigrist and Mr. Short; and in subsequent issues of THE AIRCRAFT ENGINEER we hope to publish articles by other equally well-known designers and constructors, a number of whom have promised their co-operation. To those who have helped us to produce this first issue we extend our cordial thanks, and we believe that each has, in his own way, contributed something to the general knowledge, which will be appreciated by all the more technically minded of our readers. Our non-technical readers, if they are not able to follow the various arguments, may, at any rate, obtain a general idea of the conclusions, and at the worst they have always the alternative of skipping this section altogether.

◆ ◆ ◆

The Auxiliary Air Force

The discussion at the monthly dinner of the Royal Aero Club on Jan 20 on the Auxiliary Air Force certainly cleared the air, and elicited some facts which, although previously published, had not been generally realised. Taking the debate as a whole, the fact emerges that the future of this force, and presumably the future of the Special Reserve squadrons likewise, is not strictly speaking an aeronautical matter at all. It depends on policy, and on the manner in which that policy is carried out. Guidance should be sought from the lessons of the old volunteering movement and from the Territorial Army which has succeeded the old volunteers. The policy to be adopted depends on knowledge of men far more than on knowledge of machines; and sound counsel should be sought rather from experienced officers of the citizen armies than from aeronautical experts.

Mr. Handley Page touched on one matter which was very much to the point, namely whether employers should encourage their mechanics to join the A.A.F. On the outbreak of war those mechanics admittedly would be needed at their factories even more urgently than at their squadron aerodromes. Nevertheless, we hold that aircraft mechanics should be encouraged to join up, as they will help to set a standard and will act as a leaven among the other airmen who have all to learn. Squadron leaders, in our opinion, should accept those men for that reason, but should realise that they will lose them immediately an emergency occurs.

Major Mayo raised the question of pay. As a matter of fact all members of the A.A.F., like the Territorials and old Volunteers, do receive pay on appropriate occasions. The chief point about pay for a citizen soldier is, not that it attracts a more desirable type of man (it does not have that effect), but that it gives him a certain status.

The theory was put forward that in a technical corps a prime necessity is that the officers must be more highly technical than the other ranks. Though technical knowledge is desirable, by far the most necessary quality in an officer is ability to command, to understand his men, to lead, to organise. An officer who has that capacity in full measure will always find technical knowledge willingly supplied by loyal and enthusiastic assistants. On the other hand the greatest technician in the country may be incapable of commanding anything.

A point of prime importance which was not brought forward on Wednesday evening is the sentiment which is to exist between the regular R.A.F. and the two citizen air forces. If a genuine feeling of brotherhood in arms and of the air is generated now while all the forces are young, the future path of the new forces will be smoothed to an extent which can hardly be realised by those who have had no experience of the difficulties of the old Volunteers. Wars which really are wars cannot be won by Tommy Atkins or his aerial counterpart; it is necessary to call in John Bull. It therefore behoves the Royal Air Force to give the help and encouragement which no one else can give to the new citizen squadrons; and it is particularly the duty of the Air Staff to omit no step which can in any way foster good feeling between the two classes of force.

◆ ◆ ◆ ◆

R.A.F. Badges

SUPPLIES of the badge which it was decided last September to supply to officers attached to the Royal Air Force for service in the Fleet Air Arm (illustrated in FLIGHT for November 12 last) are now ready for issue at the Royal Clarence Yard, Gosport. Two kinds of badges are stocked, one without safety pins, price 2*s.* 9*d.*, and another with safety pins, for use with white uniform, price 3*s.* 6*d.* In future the badge will be assumed by attached officers immediately on joining a training school of the R.A.F. for their initial flying training.

The Air Ministry has granted to the County of London (Bombing) Squadron a permit to have a distinctive badge, to be used side by side with the national device on the fuselage. This badge has been designed by the College of Heralds and consists of the sword of London piercing a pair of wings, in crimson, on a white ground.

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(*Extract.*)

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"I enclose a table showing the flying carried out by the London Aeroplane Club, from the 19th August to the 30th November, on the two D.H. 'MOTHS,' fitted with 27/60 h.p. CIRRUS engines.

"From this table you will see that flying was carried out on 72 days and that 729 flights were made, resulting in a total flying time of 298 hours 45 minutes.

"We are extremely satisfied with the performance of the two CIRRUS engines supplied by you in the D.H. 'MOTHS.' The only trouble we have experienced with these engines is with the valve seatings, but the modification you made has entirely corrected it.

"I trust that you will find these figures of interest."

"Newcastle-upon-Tyne Aero Club, Ltd.,
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"25th November, 1925.

(*Extract.*)

"The Cirrus engines fitted to the machines have proved exceptionally reliable and economical.

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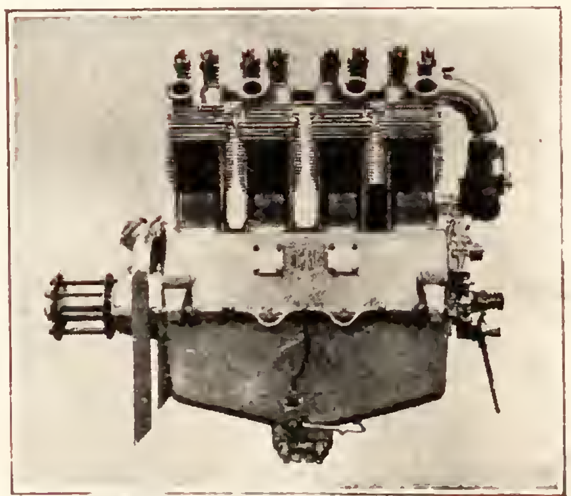
"No other replacements whatsoever have been necessary on either engine, although over 100 hours flying has been done."



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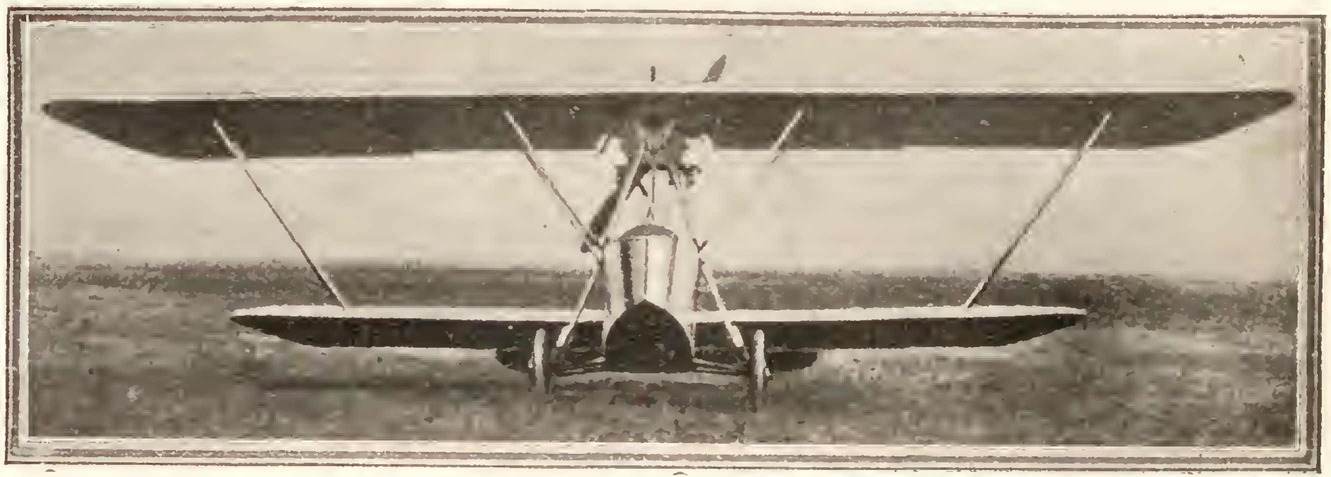
"A FLYING BOAT ON WHEELS"

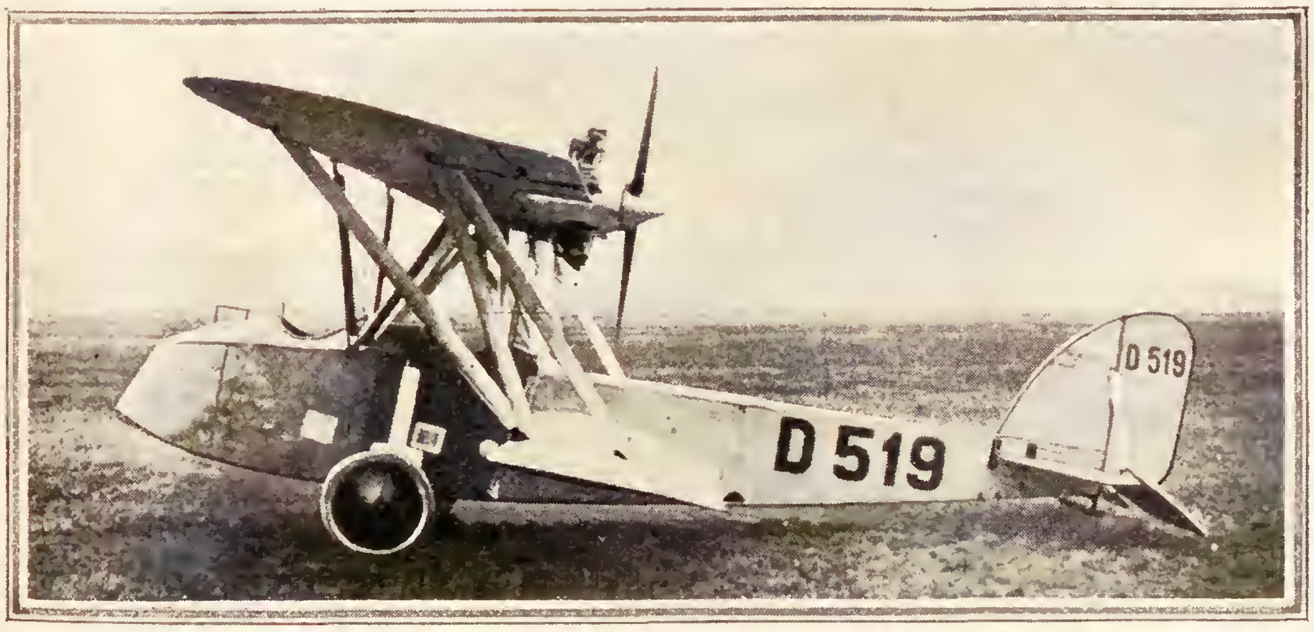
The Albatros L.72 Two-Seater Light 'Plane

It is a characteristic of modern tendency in aircraft design that, except for flying boats, the "pusher" type of machine is now practically never seen. Much of the early experimental work was done on pusher machines, commencing with the early machines built by the Wright brothers, and continuing for a considerable time after the outbreak of the war, 1914–18. When Mr. A. V. Roe introduced the tractor type of biplane, the type met with such instant success that it very quickly became adopted, not only in this country, but throughout the world, until at the present moment it is almost the only type ever seen as far as single-engined machines are concerned, with the one exception mentioned above, *i.e.*, the flying boat.



The Albatros L.72: This front view shows that in spite of the interplane struts, the wings are of the cantilever type, without external bracing.

We think the majority of those of our readers who had any experience of the pre-war pusher aeroplanes will probably agree that for sheer comfort in flying the old pusher had much to recommend it. For one thing one was not worried by a slip-stream of high velocity as soon as one looked over the cockpit coaming, and the engine noise was greatly lessened owing to the placing of the power plant behind the occupants. That the pre-war type of pusher aeroplane, with open tail booms incorporating a fair amount of wiring, was a super-efficient type can scarcely be argued, but if one is not concerned with ultra-efficiency, there is much to be said for the type, and it is therefore rather interesting to find a German designer reverting to the pusher type in a machine designed for the recent German "Sales Competition." The rules for this competition were designed with the object of producing safe and comfortable machines, rather than machines of very high efficiency and having a high top speed. Among the stipulations for this competition, mention may be made of the fact that the take-off must not occupy more than 100 m. and the machine must pull up after touching in not more than 75 m., while the rate of climb must be greater than 1·5 m. per second (300 ft./sec.). The top speed must exceed 90 kms./h. (56 m.p.h.). It was also stipulated that the machines must be of the pusher type.



Albatros L.72 Light 'Plane: Side view. Note the pronounced stagger.

According to our German contemporary, *Illustrierte Flug-Woche*, the Albatros designers considered the following possible arrangements to comply with the regulations: the tail-first or canard type of machine, the tailless aeroplane, the pusher with open girder tail booms, and the fuselage machine with the engine in the trailing edge of the top plane. It was considered that the pusher with open girder tail booms was ruled out for aerodynamic reasons, the tail girder offering too great air resistance. The tail-first machine and the tailless machines, although offering interesting possibilities, were of somewhat doubtful qualities, as many problems have not yet been solved in connection with them, such as dynamic stability, controllability and behaviour in spins, and so the Albatros designers, by a process of elimination, arrived at the fuselage type with the engine built into the top plane. The result was the "flying boat on wheels" shown in the accompanying illustrations.

The Albatros L.72 is a two-seater light 'plane, with a fuselage of mixed construction, and with the wing area arranged in the form of a biplane, the lower plane of which is considerably smaller than the top plane in both span and chord. The biplane type was chosen in order to get the greatest practicable wing area into the smallest overall size, and also to keep down the item of wing weight. The competition placed a premium on rate of climb rather than on top speed, and rate of climb was more easily obtained with light wing loading. It was also desired to give the two occupants as good a view as possible, and in order to attain this object the two main planes were very heavily staggered in relation to one another. A glance at the illustrations will show that the stagger is so pronounced indeed that the problem of building a biplane with the usual external wire bracing would probably have been extremely difficult, owing to the very poor angle of the inter-plane struts. It was therefore decided to make the machine a cantilever biplane, and the inter-plane struts are intended mainly to stiffen the wings against torsional stresses.

Except for the unusual stagger, the Albatros L.72 is designed very much as is a flying boat, that is to say, the engine structure is independent of the wing structure to the extent that, although faired into the top wing surface, the engine is carried on four separate tubes, rising from the fuselage. The top plane is supported from the fuselage by two N-struts braced diagonally to centre them over the fuselage, but outside these N-struts there is no wire bracing of the wings.

Both top and bottom planes have wing spars and ribs of spruce, and the spars of both planes run right through. The top plane is perfectly straight, but the bottom plane has a dihedral of 1½ degrees. Fittings are mainly of duralumin and the inter-plane struts are steel tubes with sheet aluminium fairings. The wing section is a fairly thick one (about 9 in. on the top plane) and was chosen on account of its high value of the ratio $\frac{K_L{}^3}{K_D{}^2}$, which governs the climb.

In the construction of the fuselage two distinct methods have been employed. The front portion, in which the cockpits for pilot and passenger are accommodated, is a flat-sided, plywood-covered box, built rather stronger than strictly necessary in order to provide protection for the occupants in case of a crash. The rear portion of the fuselage is in the form of welded steel tubes with piano-wire bracing, and the two halves of the fuselage are joined just aft of the passengers' cockpit. Incidentally it may be mentioned that the lower plane passes through the welded tube portion where the question of its insertion and attachment is rather easier, owing to the fabric covering.

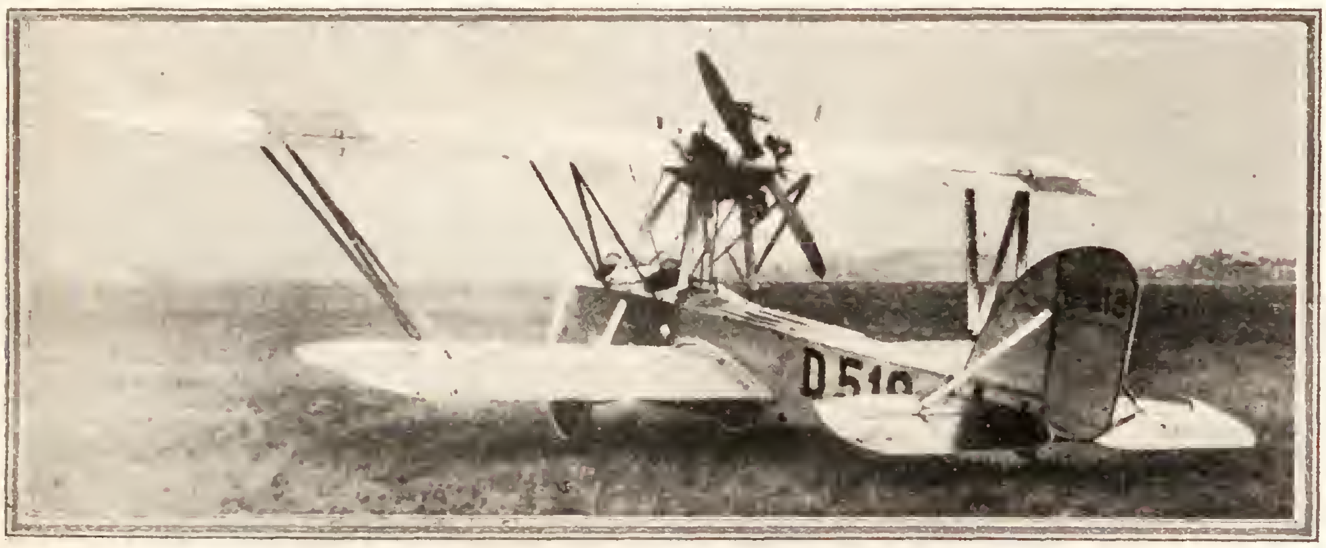
As already mentioned, the 55 h.p. Siemens radial engine is mounted on four steel tube struts from the top of the fuselage, on a structure independent of the wing structure. A neat aluminium cowl fairs the engine into the top wing surface and a spinner round the propeller boss at the back completes the fairing of the power unit, of which only the outer portions of the cylinders project. The petrol tank is built into the top plane forward of the engine, and although it is stated that gravity feed is employed, provision is made for maintaining a slight pressure in the petrol tank. As the tank is ahead of the engine, presumably the only time when gravity feed would not suffice would be during a steep dive. The petrol tank has a capacity of 50 litres (11 gals.) and the oil tank, which is placed immediately ahead of the engine, has a capacity of 12 litres (2·64 gals.).

The undercarriage is of simple type, the two wheels being carried on short stub axles hinged to the lower longerons of the fuselage and braced forward by tie-rods forming horizontal V's with the axles. Springing is provided by telescopic struts running to the top longerons of the fuselage, and rubber shock-absorbing gear.

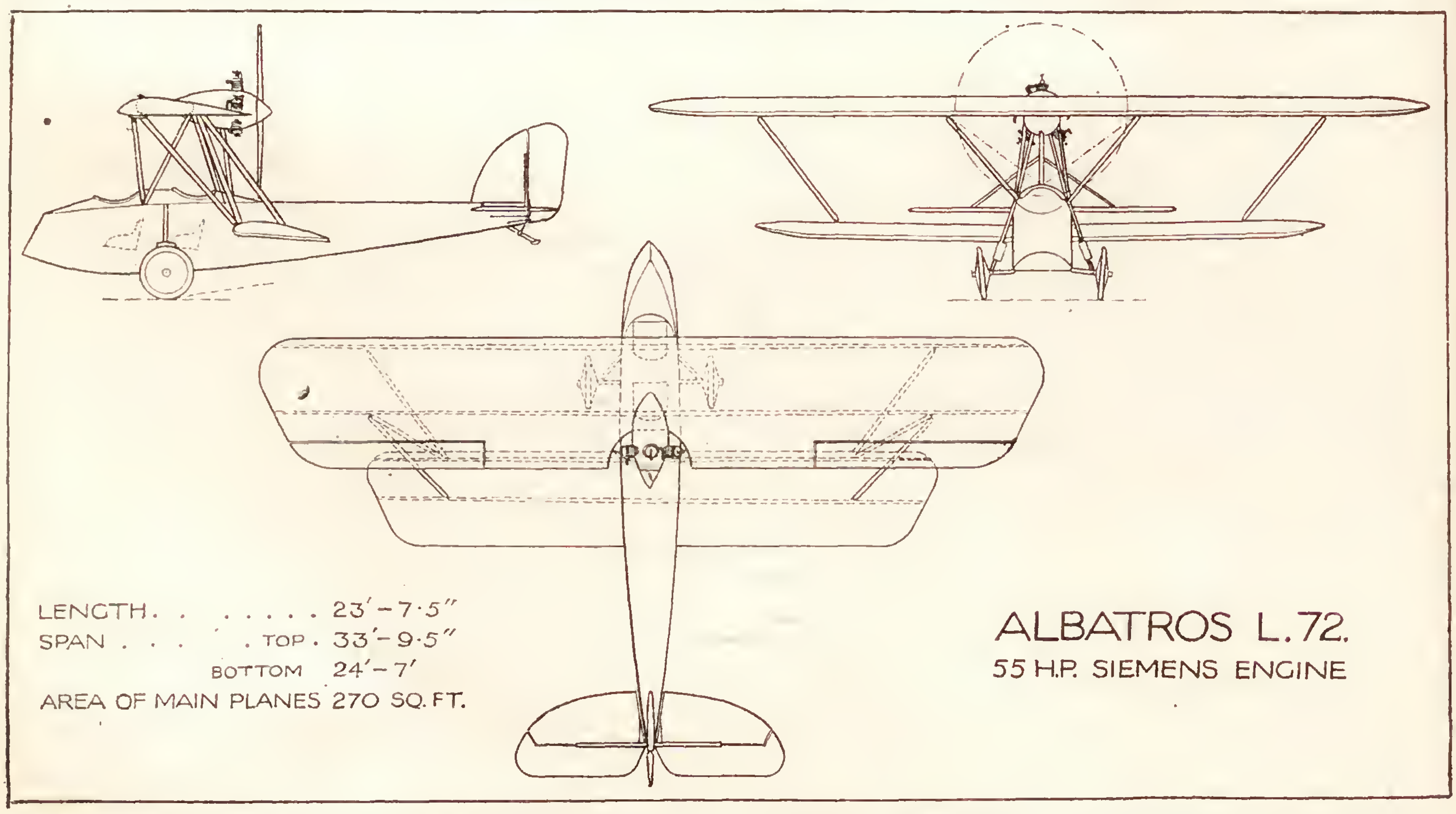
The tail planes are of duralumin and steel construction and fabric covered, and provision is made for trimming the tail plane, this obviously being advisable in a machine of this type, where considerable changes in trim may be expected between the "engine on" and "engine off" condition. It is stated, however, that the machine handles very nicely, and that the only change with engine fully throttled down is a slight tail-heaviness which is easily corrected by slightly increasing the angle of incidence of the trimming tail plane.

The main overall dimensions of the Albatros L.72 are shown on the general arrangement drawings. Following are the main item weights: weight of machine empty, 450 kg. (990 lb.); pilot and passenger, 160 kg. (352 lb.); petrol, 38 kg. (83·6 lb.); oil, 12 kg. (26·4 lb.); total loaded weight, 660 kg. (1,452 lb.).

The wing loading is 5·38 lb./sq. ft. and the power loading 26·4 lb./h.p. With the useful load indicated above, the original machine attained a top speed of 125 k.m./h. (78 m.p.h.) at ground level, and the landing speed was 65 k.m./h. (40 m.p.h.). An altitude of 1,000 metres (3,300 ft.) was reached in 12 minutes.



The Albatros L.72: The 55 h.p. Siemens radial engine is mounted on the trailing edge of the top plane, and drives a pusher airscrew. The view from the cockpits should be excellent.


LENGTH . . . . 23′-7·5″
SPAN . . . . TOP . 33′-9·5″
BOTTOM 24′-7′
AREA OF MAIN PLANES 270 SQ. FT.
ALBATROS L.72.
55 H.P. SIEMENS ENGINE

A MODERN "PUSHER" LIGHT 'PLANE: General arrangement drawings of the Albatros L.72 with 55 h.p. Siemens radial air-cooled engine.

AVRO

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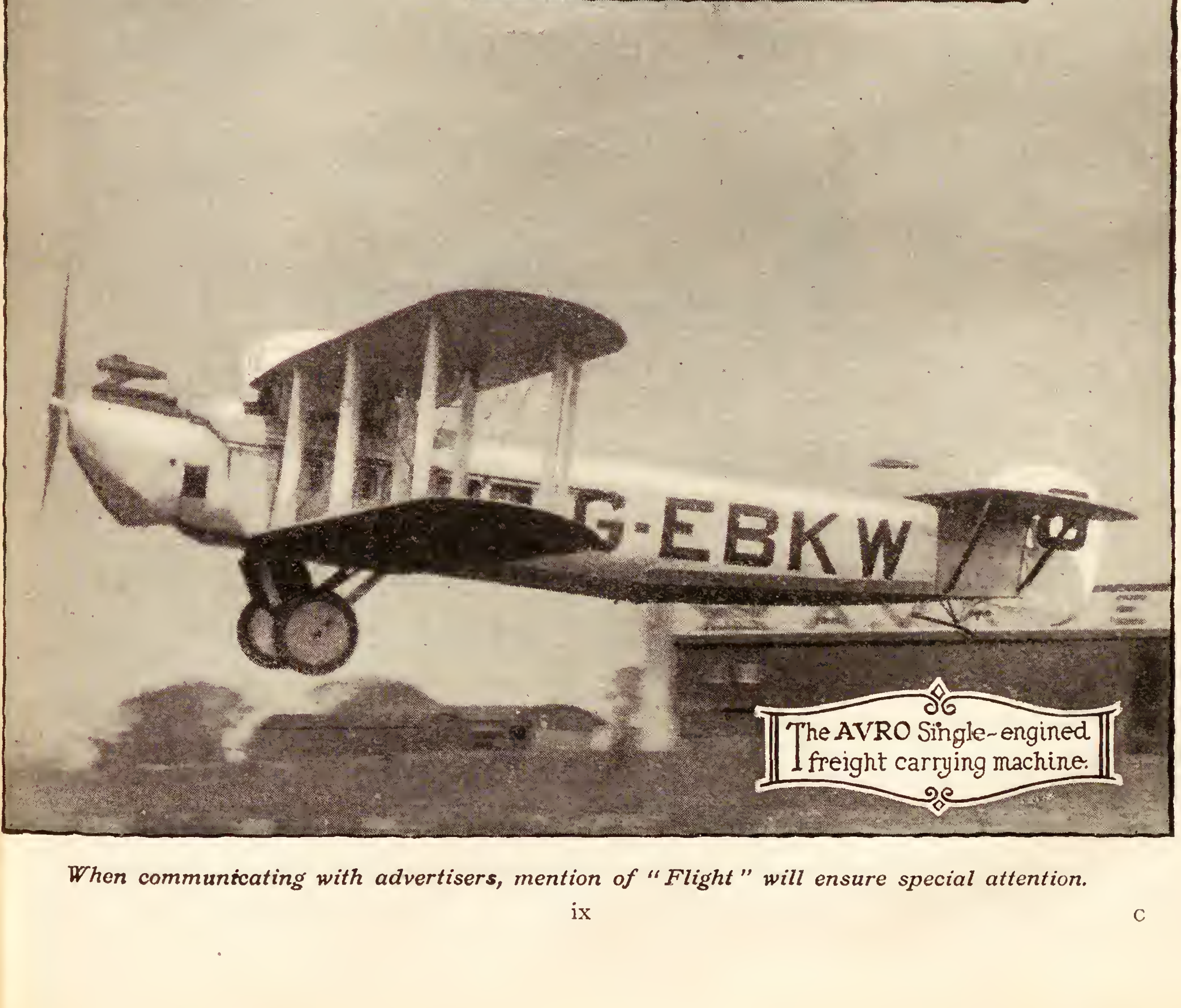

The AVRO Single-engined freight carrying machine.

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The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

COMMITTEE MEETING

A MEETING of the Committee was held on Wednesday, January 20, 1926, when there were present :— Lieut.-Colonel F. K. McClean, A.F.C., in the Chair, Ernest C. Bucknall, Lieut.-Colonel M. O. Darby, Lord Edward A. Grosvenor, Wing-Commander T. O'B. Hubbard, M.C., A.F.C., Lieut.-Colonel M. O'Gorman, C.B., F. Handley Page, C.B.E., T. O. M. Sopwith, C.B.E., and the Secretary.

Election of Members.—The following new Members were elected

James Arnold Brewster,
Stephen Donoghue,
John Philip Hall,
Alonzo Limb,
William Newton,
Walter Ridley,
Thomas Neville Stack.
Ernest Leslie Howard Williams.

Aviators' Certificates.—The following Aviators' Certificates were granted :—

7978. Charles d'Urban Shearing, February 15, 1925.
7979. Robert Nixon Thompson January 7, 1926.
7980. Kenneth Macdonald Beaumont, January 8, 1926.

Committees.—Reports from the following Committees were received and adopted · Joint Standing Committee of R.Ae.C. and S.B.A.C., House Committee, Finance Committee.

Britannia Trophy.—It was decided to consider the award at the next meeting of the Committee to he held in February. In the meantime the Secretary was instructed to prepare a list of meritorious performances for the year 1925.

Annual General Meeting.—The Annual General Meeting of the Club was fixed for Wednesday, March 31, 1926.

F.A.I. Paris Conference.—Colonel M. O'Gorman reported on the Paris Conference of the F.A.I. held on January 11, 1926. The report included the following items :—

The Rules of the Schneider International Seaplane Race, 1926.
The Rules of the Gordon Bennett Balloon Race, 1926.
Aviators' Certificates. Test "A."

The compulsory flight of one hour at an altitude of 6,000 ft. was eliminated. Test "A" would now be as follows :—

> "A flight without landing during which the pilot shall attain a height of 2,000 metres above the point of departure. The descent shall finish with a glide the engine cut off at 1,500 metres above the landing ground. The landing shall be made within 150 metres or less of a point fixed beforehand by the Official Examiners of the test, without starting the engine again."

A vote of thanks to the Club delegates (Lieut.-Col. M. O'Gorman and Major J. S. Buchanan) was unanimously passed.

Foreign Attachés.—The following Attachés were elected Honorary Members of the Club for the year 1926 :—Lieut. J. Bos (France), Commander R. A. Burg (America), Major H. C. Davidson (America), Capt. Luke N. McNamee (America), Commander J. C. Hunsaker (America), General A. Guidoni (Italy), Henri F. Martin (Switzerland), Capt. T. Toyoda (Japan), Lieut.-Commander Hirose (Japan).

Private Flying.—The following Sub-Committee was appointed to draw up recommendations on Private Flying:—F. Handley Page, C.B.E., Lieut.-Col. M. O. Darby, Major H. Hemming, Squad.-Leader M. E. A. Wright, H. E. Perrin (Secretary).

Offices : THE ROYAL AERO CLUB,
3, CLIFFORD STREET, LONDON, W. 1.
H. E. PERRIN, Secretary

Britannia Trophy.

THE Committee of the Royal Aero Club will consider the award of the Britannia Trophy for the year 1925 at its meeting in February next. The Britannia Trophy is awarded each year "to the British Aviator, who, in the opinion of the Committee of the Royal Aero Club, shall have accomplished the most meritorious performance in the air during the year." The Royal Aero Club will be glad to receive particulars of any meritorious performances for consideration by the Committee when making the award. Particulars should be addressed to the Secretary, Royal Aero Club, 3, Clifford Street, London, W.1, not later than February 15, 1926.

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ROYAL AERO CLUB THIRD MONTHLY HOUSE DINNER

The Auxiliary Air Force Discussed

THE subject for discussion at the third monthly dinner of the Royal Aero Club was the Auxiliary Air Force, and the chair was taken by Squadron-Leader Lord Edward Grosvenor, commanding No. 601 County of London (Bombing) Squadron. The loyal toast was proposed by the Chairman and duly honoured before the appearance of the pudding, and consequently, when the Chairman rose a second time to open the discussion, he felt bound to remark that the situation was obscure, owing to the fumes of tobacco smoke, but he declared that the Auxiliary Air Force would find its way through the gloom. He declared also, amidst applause, that it would carry on the old tradition of the Royal Air Force. He then called on Air-Commodore J. G. Hearson, C.B., C.B.E., D.S.O., who is the responsible officer for Special Reserve and Auxiliary squadrons, to address the company.

Air-Commodore Hearson said that there had been a good many public pronouncements on the subject, but there was a certain amount that was worth reiterating. The Auxiliary Air Force was on the same lines as the Territorial Army and the terms of service were very similar. The A.A.F. squadrons were intended to take their place among the combatant units of the Air Defence Force. They would be in the front line of air defence. They were all intended to be bombing squadrons, and bombing was the counter-attack of the defence. There was nothing of the Reserve about the A.A.F. Every officer and every airman undertook to be at his post at the first threat of air invasion, and to set out on bombing expeditions described as "the points of departure and of *intended return* (laughter) of which were in this country." It was a real man's task. There would be no time for training or enlistment on a wave of patriotic ardour. Every officer and airman must be at his post before the whistle blew. The man who waited for the war to break out would be too late.

There were a good many reasons why certain squadrons should be on an auxiliary basis. One important reason was the desire that flying should be spread among the civil population and that men should get in touch with service flying while remaining civilians. The Royal Aero Club was doing great work in promoting the civilian flying clubs which would be splendid recruiting grounds for the A.A.F., and he would like to see one such club in the same district as every A.A.F. squadron. As for the progress up to date, already four squadrons had made a beginning, two in London, one in Edinburgh, and one in Glasgow. A fifth was in prospect during 1926 at Birmingham. Three of the commanding officers were present at the table. No. 600, the City of London Squadron, had had a large number of applications for commissions, and there would be no difficulty in finding good officers. As for No. 601, the County of London Squadron, their chairman of that evening was always coming to him to tell him of his latest find, and he walked about the street with a formidable list of names in his pocket. As for the two Scottish squadrons, applicants for commissions were not exactly tumbling over each other. The speaker sought for an explanation in the Scottish character (with which he is evidently not very well acquainted, but when tackled by a subsequent speaker about his remarks he gave an assurance that he had not intended anything disrespectful about it.) As regards airmen, on the other hand, recruits were coming forward for the two Scottish squadrons in good numbers and good quality. On the first parade at Edinburgh the regular airmen were quite anxious about their own prowess beside the recruits. The latter were many of them skilled tradesmen, of the type which they wanted, and many had been Boy Scouts or had come from the Boys' Brigade. In London recruiting was slow. It was harder to spread the gospel there and to awaken the family feeling, although they had in the chair a wonderful example of the Squire. (Applause.) But they did not want to rush things, and they wanted to have as few mistakes to regret as possible. They did not want the wrong type of recruits. For instance, quite recently 1,500 recruits came forward for the Special Reserve Squadron in Belfast, and of them only 10 could be accepted. That showed that they were keeping the standard high, and that a good man would be sure of finding himself in good company. He ended with a word of praise for " that super-man " the regular adjutant of an A.A.F. squadron.

Mr. Handley Page made an eloquent, amusing, and serious speech, in which he took two points and rubbed them in very hard. One was that if the employees of aircraft factories joined the A.A.F., on the outbreak of war they would have to leave the squadrons as they would be more urgently required at their factories. The second point was that man-power would be little use in the next war without adequate equipment, and that if the aircraft manufacturers could not maintain and preserve in peace-time a strong staff of skilled hands, they would not be able to get them after the outbreak of war, and, in consequence the A.A.F. and other air forces would not get that equipment.

He began by saying that he hoped he would not disappoint the company by being serious but on the subject of defence they would have to be serious. The A.A.F. deserved the sympathy of every employer. But if their employees all joined up, where could they recruit more in war-time ? In the next war the army would be mechanicalised, and there would be a great demand for mechanics. This was an opportune time to discuss the A.A.F. They had a R.A.F., an A.A.F., and the industry. In 1915 we had man-power, but we failed for want of munitions. Our soldiers had no shells and no aircraft to make victory possible. Then in 1917 the United States of America came into the war, and decided that aircraft could find the way to victory. What did they do ? They spent £650,000,000 sterling, " a sum on which I should be quite willing to retire " (laughter). They turned out about two aeroplanes which were able to fly across the lines. He would not be satisfied with that result, even from Cricklewood. The lesson was that we must think out our plans for providing equipment in good time. Older civilisations had passed away because their equipment had not been equal to their degree of civilisation. The Romans worked on man-power. The barbarians beat them at that game. He thought of the hordes of Russia, which had no rifles, no equipment, because they had no factories.

We were now faced by a crisis. There was need for stringent economies, and we must cut down our expenditure. There were two sorts of economy, one apparent but false, the other long-sighted and real. We were no longer an island, but we were spending millions on our navy and army which were completely obsolete (sensation). It was a fact ; they were no use at all when they could be bombed by aircraft. The authorities would probably say : " The aircraft industry has made profits in the past : they can keep them and carry on." The aircraft industry was not like the motor industry, and technical improvements such as super-charged engines (a voice : " and slotted wings ") might change the whole of our equipment and change it for the better. So our engineering staffs must be looked after. In 1946 it would be no use to go to war with Henry Farman box kites. If it were proposed to cut down Hanwell (" I mean Halton and Cranwell ") there would be an outcry, for they represented man-power, but when it came to cutting down the industry—— !

Mr. G. C. Colebrook asked for more information about the A.A.F. What attractions did it hold out to the mechanic who was asked to do in his spare time what he had been doing all the week ? Would the A.A.F. squadrons be ready to bomb on the outbreak of war ? He thought that the Navy was still necessary for securing the trade routes and our supplies, though when the ships approached harbour the aircraft co-operated with the warships.

Air-Commodore Hearson replied to these two speeches. He thought the industry might spare them some mechanics, for magnificent equipment would be of no use if only the fools of the nation were put in charge of it. The spread of interest among the civil population would indirectly help the employers. As for Mr. Colebrook's questions, they could not foretell the result of the experiment, but it was worth making it. In Scotland they were actually getting mechanics who would take a " busman's holiday," and he did not think that London would for long lag behind.

Commander Perrin, after eliciting the fact that a successful candidate for a commission could be recouped on his expenses in learning to fly, up to £115, said that the aeroplane clubs were teaching men to fly for about £15-£20, and he thought that the Government should give the clubs a bonus for each man so taught.

Wing-Commander A. W. H. James, commanding No. 600, City of London Bombing Squadron, said that the two popular watchwords of the day, Economy and Democracy, would be met in the A.A.F. He explained that among the attractions which would tempt a mechanic to take a " busman's holiday " was a good club at headquarters, where he could get his lunch in comfort.

Mr. T. O. M. Sopwith restored geniality to the discussion (this garment had begun to wear somewhat thin) by remarking that the Aero Club did not wish to ask all these high Service officers to attend merely in order to pull them to pieces. If the industry were on a proper footing, it could give more help to the A.A.F., to which, however, he wished all good luck.

Major Mayo said that the conditions of the A.A.F. were such that few could afford to join. They must look for leisured men, *e.g.*, fox-hunters (Wing-Commander James had remarked, amid laughter, that his proper vocation was to hunt the fox). Voluntary assistance was not a right principle, and the Government should pay those who joined. If that were done, we might reduce the regular R.A.F. to a nucleus and have a large A.A.F.

Squadron-Leader H. Dawes, M.B.E., of the S.R. & A.A.F. Headquarters, stated that the good supply of airmen for the Scottish squadrons had nothing to do with industrial depression in that country, as had been stated. On the contrary, they would not accept a man who was unemployed. They wanted men with an address, about whom they could find all particulars. He informed some speakers, who had shown ignorance of the fact, that 25 per cent. of the airmen in an A.A.F. squadron were regulars from the R.A.F., while all ranks were paid according to their ranks when attending annual training, and when specially called up for duty, &c., and bounties were also given.

Mr. G. Dorman said that he was always receiving requests for information from men who wanted to join, but only about one a month found that they could afford to do so. If the Air Ministry would pay for learning to fly, they would get a lot more candidates.

Capt. W. H. Sayers said that he had flown 500 hours as a pilot without a ticket, and he could not afford to take one out now. He expressed the opinion, quoting the example of a Territorial Electrical unit, that officers of a technical unit ought to be more highly technical than the men under their command.

Commander F. L. M. Boothby asked why we should concentrate attention on the air defence of London ? We should provide for the safety of the trade routes and of the Empire, and in doing so the help of the Navy was essential. To this and to other criticisms, Air-Commodore Hearson replied that he was not responsible for politics or strategy.

Squadron-Leader Lord Edward Grosvenor remarked that his airmen were coming along all right, and that No. 601 Squadron would yet surprise them all.

Colonel Mervyn O'Gorman, in a brief, witty, and excellently expressed speech, said that he wanted to help to dilute the more bilious part of the discussion. He thought that the points of view of Air-Commodore Hearson and Mr. Handley Page could be reconciled. The trouble was that we had entrusted initiative to Democracy, which was only competent to exercise a veto. What should be done was to back Air-Com. Hearson in order that Mr. Handley Page might win.

Colonel Frank McClean then proposed a vote of thanks to Air-Commodore Hearson and the other official speakers, Lord Edward Grosvenor and the Air Commodore returned thanks, and a quite lively evening ended in an atmosphere of general geniality.

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The Royal Air Force Memorial Fund

The usual meeting of the Grants Sub-Committee of the Fund was held at Iddesleigh House on January 21. Lieut. Commander H. E. Perrin was in the chair, and the other members of the Committee present were : Mrs. L. M. K. Pratt-Barlow, O.B.E., Squadron-Leader E. B. Beauman. The Committee considered in all 13 cases, and made grants to the amount of £368. (Next meeting :—February 4.)

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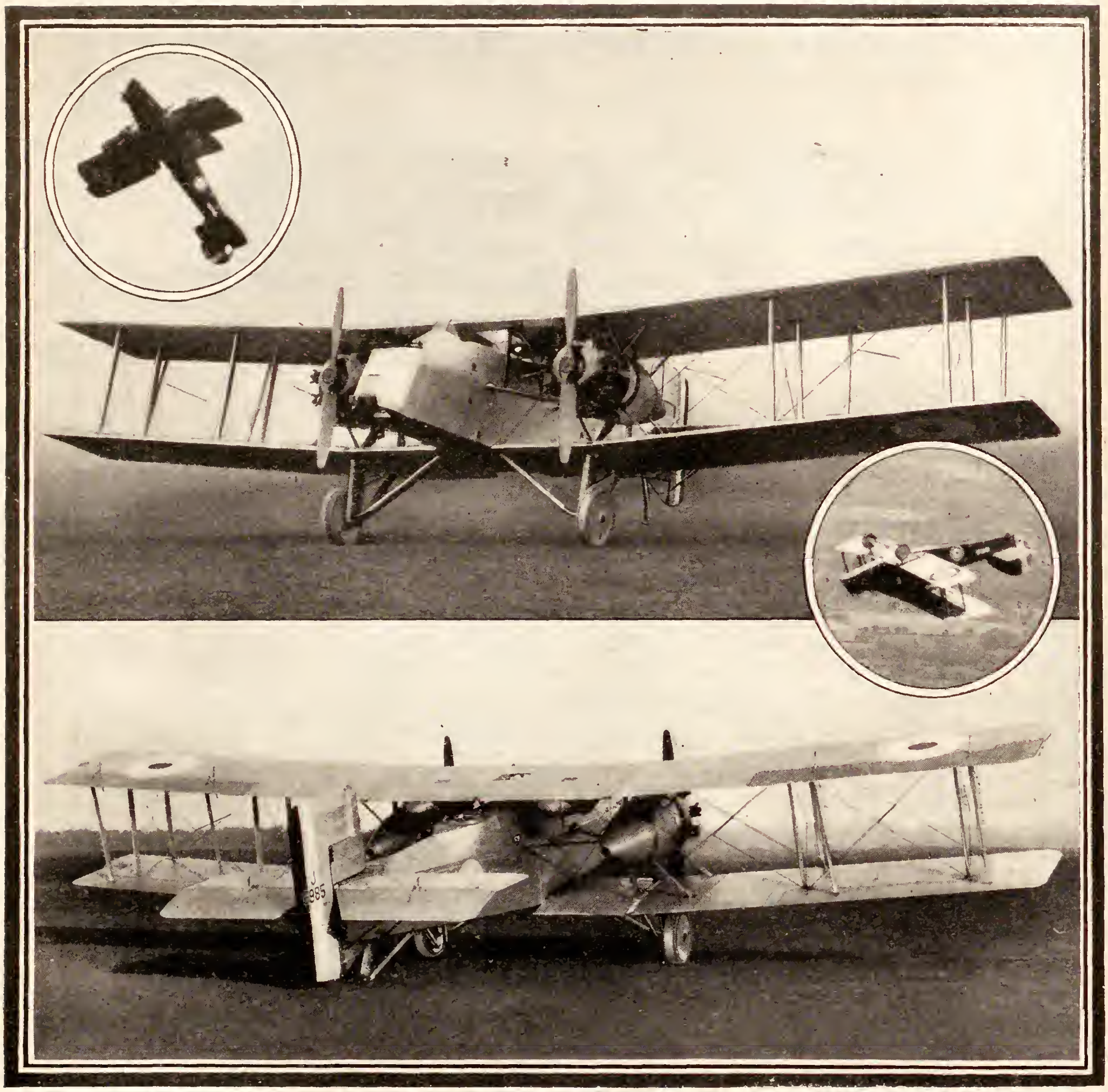

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COLLECTION

LIGHT 'PLANE CLUB DOINGS

London Aeroplane Club

FLYING was only possible on three days during the past week and the total flying time was 12 hours 10 minutes. Owing to the recent accident to G—EBLU, only one machine was available, and the pilot instructor, G. T. Witcombe, was given very little rest. On Sunday there was a large booking, and Mr. Witcombe on that day alone made 15 flights with Members.

The following Members had flying instruction :—G. Quirk, V. H. Doree, C. G. Murrell, O. R. Ogston, E. S. Brough, R. V. Banks, H. O. Richardson, T. W. Eady, D. Kittell, B. B. Tucker, W. Hay, K. V. Wright, H. R. Thomas P. Johnson, R. P. Cooper, Miss O'Brien, R. C. Brighten, G. Wallcousins, R. L. Preston, N. Jones, G. W. Howe, H. R. Presland.

The following Members flew solo :—Mrs. Eliott-Lynn, P. G. Lucas, G. N. Warwick, G. H. Craig.

The dance at the Suffolk Galleries on January 13 resulted in a sum of nearly £40 being raised for the fitting out of a members' shed at the aerodrome.

The Lancashire Aero Club

FLYING took place on Wednesday and Sunday. Mr. Cantrill and Mr. Scholes gave "dual" instruction to :—H. Jowett, 35 mins. ; P. Michelson , 30 mins. ; A Goodyear, 25 mins. ; H. Stern, 40 mins. ; R. Williams, 1 hour ; J. Leeming, 1 hour 40 mins ; A. Macnair, 30 mins. ; F. Davison, 35 mins. M. Lacayo, 30 mins. ; T. Wilkinson, 20 mins. Tests occupied 30 mins. 10 pupils had instruction. Total time flown, 7 hours 15 mins.

A Special Sub-Committee is to be appointed to deal with the question of the garments worn by Mr. Goodfellow, who on Sunday far outclassed ever Mr. Stern at his best. It is believed that the Hall Porter from The Imperial Hotel, Hythe, is to be approached with a view to him making his well-known remark, "You can't do that 'ere air !" Mr. Rex Williams, to whom this remark was addressed with such frequency at the last Lympne Meeting, is strongly in favour of trying this remedy.

The Newcastle-upon-Tyne Aero Club

FLYING report for week ending January 24, 1926.—The weather has been against flying again this week, and the Club is still hampered when the weather is good in having only one machine in service. No flying was possible at all on Thursday and Saturday, but a total of 12 hours 38 mins. was accomplished, all on LX.

Dual Instruction with Major Packman.—Miss C. R. Leathart has the largest total for the week, with four flights totalling 2 hours 10 mins. Mr. A. E. George (30 mins.), Mr. A. J. Somerville (35 mins.), A. Bell (15 mins.).

Secondary Dual.—Mr. Irving (1 hour 30 mins.). Mr. R. N. Thompson (1 hour).

Solo.—Mr. Stobie (30 mins.). Mr. Heppell, four flights totalling 1 hour 18 mins., with the following as passengers :—Mrs. Lucas, Mr. Herdman, Mr. Stanley and Mr. Ogden. Mr. R. N. Thompson (15 mins.), Mr. W. Baxter Ellis, 59 mins. solo, and 20 mins. with Major Packman as pilot, while he took cinematograph pictures. Mr. N. S. Todd, one solo of 15 mins. and three flights with passengers—Mr. W. Todd, Mr. W. Robson and Mr. J. Gibson—a further 32 mins. Mr. Walton carried out his height tests on Tuesday, remaining up for 2 hours.

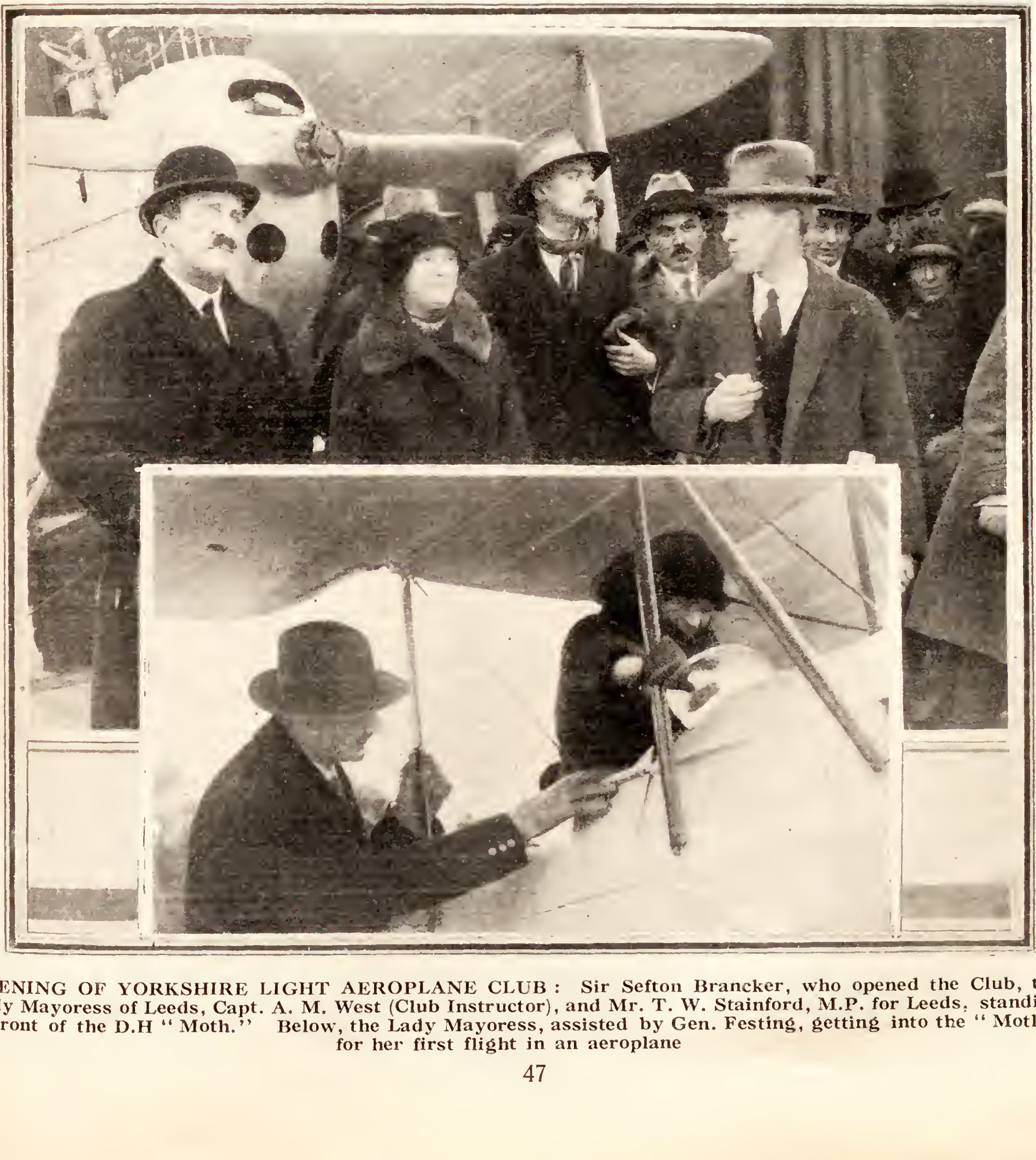
Major Packman took Miss Drummond for a 15 mins. flight on Wednesday. Instructor's tests occupied 10 mins.

Mr. R. N. Thompson received his Royal Aero Club Certificate during the week. Most of the pilots and pupils of the Club will seriously study, during the forthcoming week, the notes on "Safe Flying," by Capt. de Havilland.

The Members of the Club have been very kindly invited by the Directors of Messrs. Armstrong, Whitworth & Co. to attend two of their Lectures. The first, on Wednesday, January 27, by Major F. M. Green, O.B.E., Inst.C.E., F.R.Ae.S., on "Aeroplanes of the Past, Present and Future," and the second, on February 17, by Mr. L. S. Swinnerton Dyer, A.M.I.M.E., entitled, "Tanks and Dragons with the Army Manœuvres, 1925." Both lectures will be illustrated by lantern slides, and will be held in the Large Hall, Elswick Institute, Scotswood Road, Newcastle-on-Tyne, at 7.30 p.m.

Yorkshire Light Aeroplane Club

ON January 20 the club's newly-acquired aerodrome at Sherburn-in-Elmet, some 10 miles outside Leeds, was opened by Air Vice-Marshal Sir Sefton Brancker, Director of Civil Aviation. Prior to the actual opening ceremony on the aerodrome a luncheon was held at Leeds, at which the Lord Mayor, Mr. John Arnott, who was accompanied by the Lady Mayoress, presided, supported by Prof. Brodetski, of Leeds University and the chairman



OPENING OF YORKSHIRE LIGHT AEROPLANE CLUB : Sir Sefton Brancker, who opened the Club, the Lady Mayoress of Leeds, Capt. A. M. West (Club Instructor), and Mr. T. W. Stainford, M.P. for Leeds, standing in front of the D.H "Moth." Below, the Lady Mayoress, assisted by Gen. Festing, getting into the "Moth" for her first flight in an aeroplane

OPENING OF YORKSHIRE LIGHT AEROPLANE CLUB : Above, the D.H. "Moth" being brought out on to the Sherburn Aerodrome, prior to its first flight. Below, the "Moth" landing after its flight.

of the club, Mr. T. W. Stainford (M.P. for Leeds West), Mr. Eugene Ramsden (M.P. for Bradford North), and Sir Charles Wilson. There were also present many notable people, and, of course, members and officials of the club. In order to save time, and get out to the aerodrome as soon as possible, speeches were made *during* the lunch, and not afterwards—as is usual with functions of this character!

Sir Sefton Brancker said the light aeroplane movement was one of the most important moves in British aviation during the last few years. It was the Government's endeavour to encourage light aeroplane clubs with as litte red tape and as little control as possible by giving financial support. There was no militarism about the movement; it was an effort to educate the nation to what aviation could do, and they intended to tackle the problem more from the commercial than the military side. There was a limit to the amount of help that could be given, and the Government wanted the light aeroplane clubs, of which there were now five, to fly on their own wings as soon as possible.

It lay with the youth of the country to raise aviation to the position in which it should be, but if developed steadily they might have an aircraft industry in this country that would rival the old shipbuilding industry. He did not want to see other countries carrying our mails and passengers.

Sir Charles Wilson said if there was anything calculated to save the flying force it would be to link it up with commerce. They did not intend to let flying disappear from this country. He knew what a tremendous fleet of aeroplanes the French had, and how the Americans were increasing the number of machines, and if we did not have them we should one day find ourselves at a disadvantage. Flying in this country should be maintained at top hole, and if we made a mistake and let it go down it would be the easiest thing in the world for somebody to come along and wipe us out.

Luncheon over, all proceeded to the aerodrome, where the club's D.H. "Moth" was inspected, after which the club instructor, Capt. A. M. West made several flights on the machine, and took up a number of passengers including the Lady Mayoress, Mrs. Arnott, who thus made her first flight in an aeroplane.

At present the membership of the club numbers about 240—including three lady members—and it is hoped that a second machine will shortly be purchased to accompany the D.H. "Moth."

◆ ◆ ◆ ◆

R.A.F. Honours

The King has approved of the undermentioned rewards in recognition of gallant and distinguished service in the hinterland of Aden:—

Distinguished Flying Cross to Squadron Leader Robert Henry Magnus Spencer Saundby, M.C., A.F.C.; Distinguished Flying Medal to No. 330124 Leading Aircraftman Ernest Webb.

The Spanish Transatlantic Flight

Impressive and picturesque scenes accompanied the start, on January 22, of the Spanish Transatlantic flight from Palos de Moguer (near Huelva, in South Spain), where, 434 years ago, Christopher Columbus set out on his famous voyage of discovery. In this latest venture, Comandante Franco (the pilot), Capt. Ruiz de Alda (navigator), and Lieut. Duran, of the Spanish Navy, accompanied by a mechanic named Rada, are attempting a flight from Spain to Buenos Aires in an Italian-built Dornier-Wal flying boat fitted with two 450 h.p. Napier "Lions." Their route is via West Morocco coast to the Canary Isles, Cape Verde Isles, Fernando Noronha, Pernambuco, Rio de Janeiro, and Buenos Aires. On the eve of their departure hundreds of people assembled at Palos to give them a hearty send-off, and all through the night intense excitement prevailed; special prayers were offered and masses said for their safety and success. A start was made at 8 a.m.—the same hour at which Columbus sailed—and, after circling round the Columbus monument, the flying boat steered seawards just as the sun rose. The first stage of 812 miles to Las Palmas was safety accomplished in seven hours. Bad weather delayed them at Las Palmas until January 25, when they took off from Gaudo Bay, Grand Canary, at 8.20 a.m., and at 7.50 p.m. they arrived at St. Vincent, Cape Verde Islands (900 miles), having kept in touch by wireless with the Port Etienne station (French West Africa) throughout the trip. We hope to give further details of this flight next week.

London—Cape Town Survey Flight

Since our last report on the London-Cape Town survey flight, Mr. Alan Cobham has experienced the worst part of the journey since he left London, for after leaving Tabora in Tanganyika on January 19 he had to fly over desolate forest country rising up to 5,500 ft. above sea level. The 285 miles between Tabora and Abercorn was, thanks to the reliability of the D.H.50-Siddeley "Jaguar" combination, accomplished without mishap—a forced landing would have been really serious—and on January 20 another 345 miles over more forest to the swamp-lake district of Bengwelo, as far as N'dola. Here a wait of two days was made for fuel supplies, and on January 23 a short stage of 110 miles to Broken Hill was accomplished.

The AIRCRAFT ENGINEER

FLIGHT
ENGINEERING
SECTION

Edited by C. M. POULSEN

January 28, 1926

CONTENTS

	PAGE
"Slotted Control." By F. Handley Page, F.R.Ae.S.	1
Use of Metal in Aeroplane Construction. By F. M. Green, M.Inst.C.E., F.R.Ae.S.	4
Design from the Manufacturing Point of View. By F. Sigrist, M.B.E., A.F.R.Ae.S.	7
Duralumin Aircraft Construction. By Oswald Short	8
Technical Literature	12

OUR CONTRIBUTORS

Mr. F. Handley Page will need no introduction to our readers, being one of the pioneers of British aviation as well as a prominent constructor of modern times. Of recent years Mr. Handley Page has, perhaps, become best known, at any rate abroad, for his invention of and work on "slotted" aerofoils. In the article which Mr. Handley Page contributes this week the subject of control at stalling speed is dealt with, and we may point out that the data given have never hitherto been published.

Major F. M. Green has for a number of years been associated with the Armstrong Siddeley and Armstrong Whitworth concerns as chief engineer. In the earlier days of aviation he was doing design work at the Royal Aircraft Factory at Farnborough, so that he has had a long experience in aircraft engineering. This week Major Green contributes an article dealing with the use of metal for aircraft construction.

Mr. F. Sigrist is probably one of the oldest members of the British aircraft industry (in the sense of his having been connected with aviation since the beginning, and not in actual years), having been intimately connected with Mr. T. O. M. Sopwith since 1910, and being now joint managing director with Mr. Sopwith of the Hawker Engineering Co. In the article which he contributes to our pages this week, Mr. Sigrist deals with the subject of design from the works point of view, a subject upon which he is singularly qualified to write.

Mr. Oswald Short is another pioneer of British aviation, having, with his brothers, started the aviation works bearing their name in the very beginning of British aviation. Since the war Mr. Short has devoted much time to the subject of all-metal, and particularly all-duralumin, construction, and his firm have evolved forms of construction in that material which strike out along entirely new lines. Moreover, Short Brothers were the first to build a British all-metal machine, and it is largely due to Mr. Short's efforts that the Air Ministry restrictions on the use of duralumin have been relaxed. In his article this week Mr. Short gives his reasons for choosing duralumin.

TESTS ON AN AEROFOIL WITH TWO SLOTS SUITABLE FOR AN AIRCRAFT OF HIGH PERFORMANCE.

(Lift, Drag, Rolling and Yawing Moment Measurements.)

By F. Handley Page F.R.Ae.S.

The results that are described in this article form a complete series of tests on an aerofoil fitted with front and rear slots, the rear slot being formed between the portion of the plane aft of the rear spar and the forward portion of the flap. The section on which these tests were carried out is one that is suitable for a machine of high performance, and is, in the slot closed position, a slight variation of RAF/15, the camber being increased to accommodate rather larger wing spars than are possible with RAF/15 section.

The main characteristics of the unslotted section are similar to those of RAF/15, namely, a maximum lift coefficient of approximately 0·5 with a fairly low minimum drag, and a reasonable movement of the C.P. Slotted, the lift coefficient is increased to 0·8, and with the rear slot open and the flap inclined at 20° angle of incidence, the lift coefficient is increased to 1.

Here, then, are comprised the very desirable characteristics of RAF/15 when the slot is closed, together with a lift coefficient of 1 with slot open.

In addition to the data on lift, rolling and yawing moments have also been measured, when the front slot is used differentially to vary the lift on one side or the other of the planes, and so aid lateral control.

The outline of the section is shown in Fig. 1, and the ordinates in Table 1.

Table 1.

H.P. Aerofoil A.1.

(Ordinates given as fractions of the chord.)

Distance from Leading Edge.	Height of Upper Surface.	Height of Lower Surface.
0	0·0143	0·0143
0·01	0·0297	0·008
0·02	0·0385	0·005
0·03	0·0451	0·003
0·04	0·0495	0·002
0·05	0·0539	0·001
0·06	0·0572	0·001
0·08	0·0627	0·000
0·12	0·0693	0·001
0·16	0·0726	0·003
0·22	0·0748	0·006
0·30	0·0737	0·008
0·40	0·0715	0·008

Table 1 (*continued.*)

Distance from Leading Edge.	Height of Upper Surface.	Height of Lower Surface.
0·50	0·0682	0·006
0·60	0·0616	0·002
0·70	0·0528	0·000
0·80	0·0440	0·001
0·90	0·0319	0·003
0·95	0·0253	0·005
0·98	0·0187	0·006
0·99	0·0165	0·007
1·00	0·0110	0·0110

Construction of Auxiliary Aerofoil.

(Ordinates given as fractions of the chord.)

Distance from Leading Edge.	Height to Under Surface.	Height to Top Surface.
0	0·0143	0·0143
0·01	0·0278	0·0297
0·02	0·0360	0·0385
0·03	0·04275	0·0451
0·04	0·04780	0·0495
0·05	0·0520	0·0539
0·06	0·0560	0·0572
0·0702	0·05975	0·05975

Horizontal thickness at 0 dist. from l.e. = 0·001735.

Chord of auxiliary aerofoil as fraction of the chord = 0·0834. Gap of front slot as fraction of chord = 0·025.

Forward extension of auxiliary aerofoil for front slot open as fraction of chord = 0·0668.

Leading edge of auxiliary aerofoil on chord line.

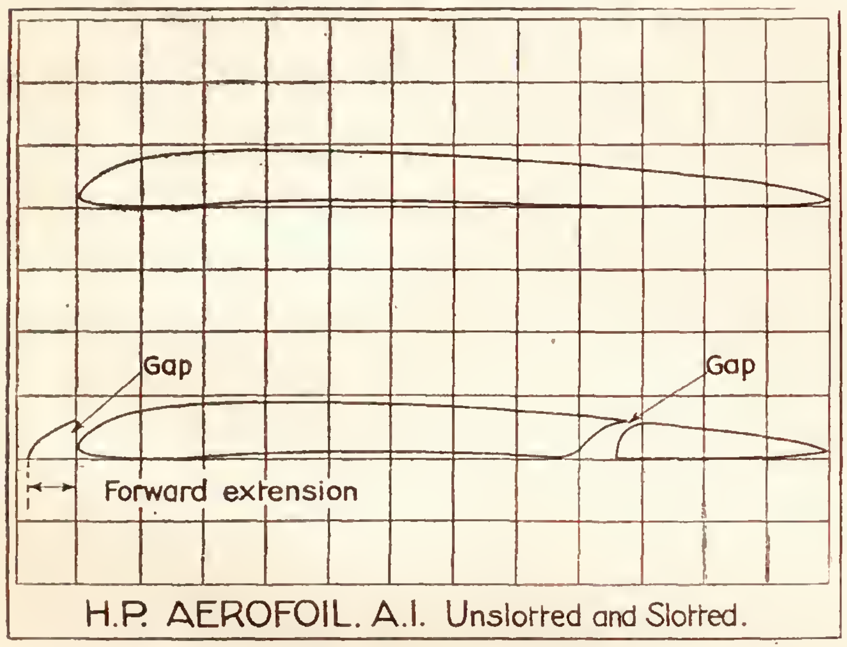


Fig. 1.

The opening of the forward slot is effected by moving forward the auxiliary aerofoil on links pivoted within the leading edge. With slot closed the aerofoil is of standard RAF/15 section. With slot open the chord of the aerofoil is increased by the amount which the aerofoil moves forward.

Construction of Rear Slot.

(Ordinates given as fractions of the chord.)

Distance from Leading Edge.	Height of Ordinates for Front of Rear Slot.
0·643	0
0·660	0·0039
0·666	0·00777
0·674	0·0136
0·680	0·0206
0·687	0·0271
0·694	0·0347
0·701	0·0403
0·708	0·0446
0·715	0·0479
0·722	0·0499
0·729	0·0506
0·735	0·0508

Distance from Leading Edge.	Height of Ordinates for Nose of Rear Flap.
0·713	0
0·720	0·0264
0·726	0·0361
0·734	0·0415
0·740	0·0444
0·747	0·0462
0·754	0·0471
0·761	0·0472
0·768	0·0466

Gap of rear slot as fraction of the chord, 0·00835.

This section has been tested at Cricklewood in the Handley Page tunnel, both unslotted and slotted ; the results for the unslotted section are given in Table 2 and Fig. 2, so that a direct comparison may be made with the slotted section.

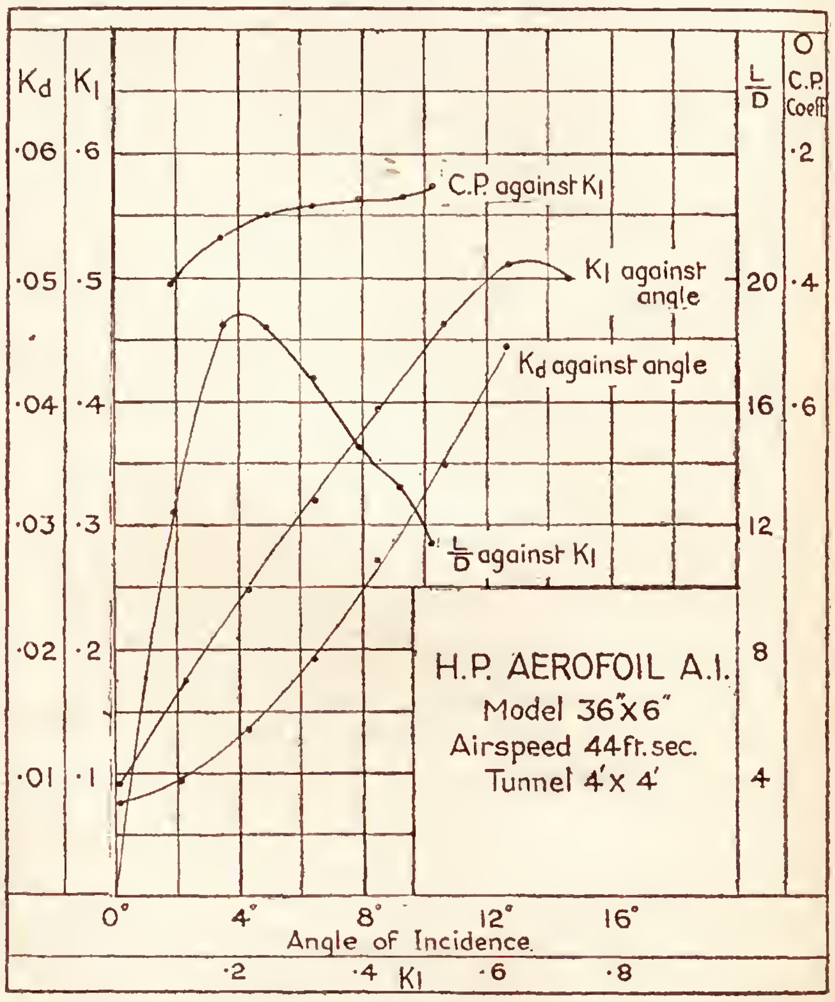


Fig. 2.

The tests were made in a 4-ft. square tunnel on a 36-in. span model. Corrections have been made for tunnel restriction to the drag coefficient and angle of incidence.

Table 2.

H.P. Aerofoil A.1. (Unslotted.)

Model—36 in. by 6 in. Airspeed—44 ft./sec.

Angle of Incidence.	K_1	K_d	$\frac{L}{D}$	C.P. as fraction of chord.
0·135	0·092	0·00742	12·4	0·405
2·257	0·175	0·00948	18·5	0·334
4·364	0·248	0·0135	18·4	0·299
6·470	0·320	0·01905	16·8	0·285
8·581	0·396	0·02725	14·5	0·278
10·68	0·463	0·0349	13·25	0·271
12·75	0·51	0·0446	11·4	0·259
14·735	0·50	—	—	—

The section tested with front slot and slotted flap, the flap being set at different angles, gave exceptionally good results. The maximum Kl_c obtained was 1·0, so that the total increase in lift is 98 per cent.

The expressions Kl_c, Kd_c and C.P.$_c$ are symbols adopted to show that the coefficients have been calculated on the "slot closed area," and in the case of C.P.$_c$ the fractions of the chord are given from the leading edge, when the slot is closed.

These symbols only apply to this type of slot where the auxiliary aerofoil is moved in a forward direction to open the slot and backwards to close it.

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THE FINANCIAL TIMES
on 8th January, 1926

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Table 3 and Fig. 3 give the results of the section with front slot and slotted flap with different flap angles.

Table 3.

H.P. Aerofoil A.1.

Model ... ... 36 in. by 6·4 in.
Chord, slot closed ... 6·0 in.
Gap of front slot ... 0·15 in.
Gap of rear slot ... 0·05 in.
Airspeed ... ... 44 ft./sec.

Flap angle 0°.

Angle of Incidence.	K_{1_c}	K_{d_c}	$\frac{L}{D}$	C.P. as fraction of chord.
0·092	0·0585	0·0166	3·52	0·557
4·30	0·191	0·0237	8·06	0·325
8·57	0·367	0·0309	11·86	0·281
12·84	0·535	0·0503	10·61	0·270
17·06	0·679	0·0750	9·05	0·264
21·23	0·788	0·1109	7·11	0·253
23·27	0·806	0·1344	6·0	0·258
25·2	0·763	0·1568	4·86	

Flap angle —10°.

0·39	0·249	0·0239	10·4	0·465
4·66	0·421	0·0382	11·0	0·382
8·92	0·585	0·0559	10·48	0·337
13·17	0·748	0·0798	9·37	0·305
15·27	0·810	0·0976	8·30	0·300
17·37	0·875	0·1125	7·77	0·285
19·40	0·890	0·1352	6·57	0·292
21·41	0·897	0·1543	5·80	
23·37	0·874	0·1764	4·95	
25·17	0·846	0·2190	3·86	

Flap angle — 20°.

Angle of Incidence.	K_{1c}	K_{d_c}	$\frac{L}{D}$	C.P. as fraction of chord.
0·67	0·428	0·0466	9·20	0·618
4·91	0·590	0·0641	9·21	0·470
9·18	0·751	0·0895	8·38	0·410
13·41	0·898	0·1196	7·51	0·330
15·51	0·965	0·1376	7·01	0·334
17·57	0·999	0·1583	6·31	0·318
19·54	0·983	0·1690	5·22	0·315
21·43	0·970	0·1892	5·11	
23·39	0·942	0·2290	4·11	
25·30	0·885	0·2610	3·39	

From this table it will be seen that the lift coefficient of approximately 1 is obtained at a reasonable angle of incidence, namely, 17½°. As the angle of incidence is practically unaltered from that of a normal machine no difficulties arise in the use of this section in respect to the attitude of the machine on alighting. Where the maximum lift is obtained at a very large angle of incidence it would be necessary to employ an unduly high undercarriage, or to set the planes at an excessive angle of incidence on the fuselage, so that at top speed the machine would fly very tail high.

High lift having been obtained with the section, it is necessary to incorporate in the design full lateral control at this high lift, otherwise, whilst the results are of academic interest, full advantage could not be taken of them in practice, as the pilot would have to fly at a higher speed in order to obtain lateral control. There are many ways in which the control can be obtained. One method is slightly to reduce the angle of the flap for lift purposes and use a maximum angle of, say, only 10°, using the further movement of 10° —or a total of 20°—for lateral control purposes, and on the other side pulling up the flap to — 20°.

The rolling moment which is obtained can be estimated approximately from the difference in the lift coefficient of the two sides of the wing under these conditions. On the one side, with an angle of incidence of approximately 20°, the maximum lift coefficient is approximately 1. On the other side, with the aileron pulled up to — 20°, the lift coefficient with slot open was 0·54 (the results with the flap at — 20° are of minor importance and have therefore been omitted from this article for the sake of clearness). There is thus a difference in lift coefficient of 0·46, which is available to provide the necessary rolling moment. Similar results were obtained on the same section with front slot closed and the ailerons moving an equal amount, namely, to + 20° on one side and — 20° on the other, the difference in lift coefficient being approximately 0·3. The rolling moment for the slotted machine is therefore superior to that of the standard machine. The yawing moment in the case of the slotted machine is slightly worse, due to the heavy drag on the ailerons set at + 20°.

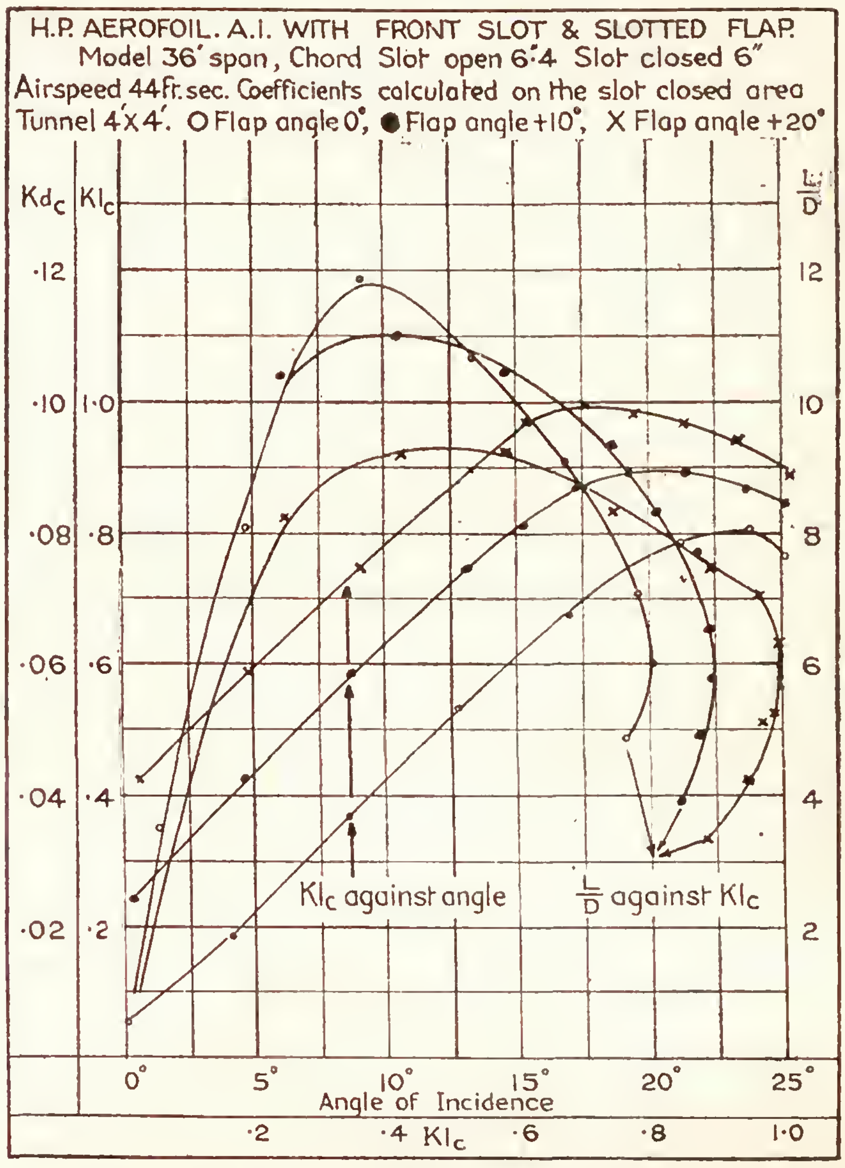


Fig. 3.

In this first method of obtaining lateral control, the lift is slightly increased on one side and considerably decreased on the opposite side.

A second and better method of control is that in which aileron and front aerofoil work in conjunction with one another. This method has already been fully explained in various Technical Memoranda issued by the Aeronautical Research Committee, and the Nos. of the Reports dealing with this are given at the end of this article. This system of slot control is of a different variety when the main slots are closed to that when the main slots are open. In an unslotted machine lateral control at and below the stalling speed is provided by opening the forward slot by a downward movement of the aileron, whilst the slot on the opposite side remains closed with the upward aileron movement.

With the main slots open an upward movement of the aileron closes the forward slot, whilst the slot on the opposite side remains open.

The difference in lift coefficient on the two sides is now much greater. If the same aileron angles as in the previous case are taken, the lift coefficient with the ailerons at — 20° and the slot closed will be 0·4, and with the aileron + 20° and slot open, the K_1 will be 1. The difference in K_1 is 0·6, or approximately twice that obtained with the ailerons alone. A further great advantage that is obtained is that the yaw is considerably reduced, and by a suitable arrangement of flap angle and slot can be made to act in the direction of the turn.

These figures are taken from a *monoplane* test.

For a *complete biplane* Fig. 4 shows Vector diagrams of rolling moments against yawing moments tested under four conditions :—

(1) With no front slot, flap angle 0°, ailerons — 20° and + 20°.

(2) With front slot open, flap angle 10°, ailerons — $5\frac{1}{2}$° and + 26°.

(3) With front slot open, flap angle + 10°, ailerons — 20° and + 20°, with a portion of the front slot equal to the span of the aileron closed on the side with the ailerons — 20°.

(4) With front slot closed and flap angle 0°, ailerons — 20° and + 20°, with a portion of the front slot open on the side with the aileron at + 20°.

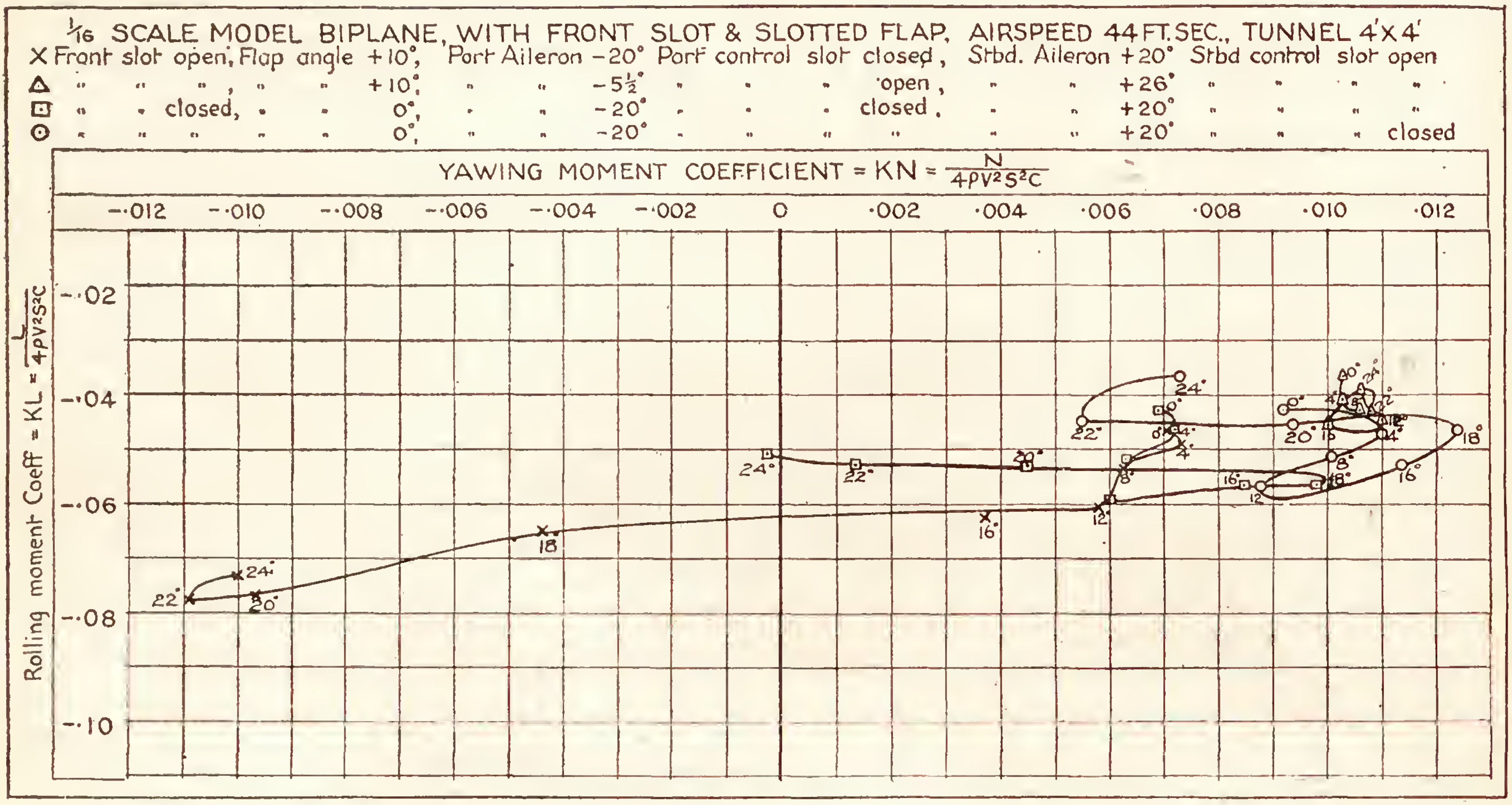


Fig. 4.

Rolling moments and yawing moments are given in coefficient form and are in relation to body axis. The tests are directly comparative and can be taken as a true indication of the advantages to be gained from "slotted control."

Reviewing these tests, Case No. 1 represents an unslotted biplane with slotted ailerons at ± 20°. The results in Fig. 4 show that the rolling moment increases from 4° up to 12°, then diminishes, and the yawing moment attains maximum at 18°. Thereafter there is a diminution in yawing moment accompanied by a slight diminution in rolling moment. This is a distinct improvement on the ordinary type of aircraft without slotted ailerons. This curve is plotted with the points at the different angles marked in the centre of a circle.

Case No. 2 is shown on the curves with the points enclosed within triangles. Here again the rolling moment even at 24° is considerable, showing the improvement obtained by using slotted ailerons, the front slot in this case being open the whole way along the span.

Case No. 3 is that of a slotted machine in which the slotted ailerons are used in conjunction with the forward aerofoil. The results are shown on the curve in which the points are marked by crosses. It will be observed that the yawing moment even at small angles is less than that in the other cases, and that from 16° it becomes rapidly negative, assisting the machine in the direction of the turn. With increasing angle also the rolling moment is increased, the rolling moment at 22° being nearly 0·08 against a rolling moment of approximately 0·045 at 0°.

Case No. 4 shows a similar result with front slot closed, the results being somewhat similar to Case 3. The points are indicated on the curves in squares. It will be seen that the rolling moment remains practically stationary, although the yaw at 4° has vanished.

In comparing these different cases, a point of particular interest is the improvement in control of the slotted machine over the standard type when both are fitted with slot and aileron working in conjunction with one another.

The result of the use of this section for the design of an aircraft can readily be seen. Unslotted, the section has a lift coefficient of 0·51 at $12\frac{3}{4}$°; slotted, the maximum lift coefficient is 1 at an angle of $17\frac{1}{2}$°. For the same landing speed, therefore, a slotted wing machine with this section could have double the loading of the unslotted type. Alternatively, with the same loading the landing speed would be reduced approximately 70 per cent. Most important of all is the great increase in lateral control at the stalling speed. Attention is particularly drawn to Case No. 3, plotted on Fig. 4, in which a very big yawing moment helping the turn is obtained by the use of the slot and aileron control.

Tests on the full scale with this section will shortly be carried out. Tests both for lift coefficient and rolling moments on a completely slotted machine with a loading of between 12 and 13 lbs./sq. ft. with a slightly different section have given confirmatory results on the values of the lift as well as rolling and yawing moments. The mechanical details present no difficulties in construction. The forward aerofoil is made out of a single Duralumin plate carried on links from the front spar. Closed, the aerofoil rests against the leading edge and the section is a standard unslotted one. It is hoped that photographs and details of this may be published in a later article.

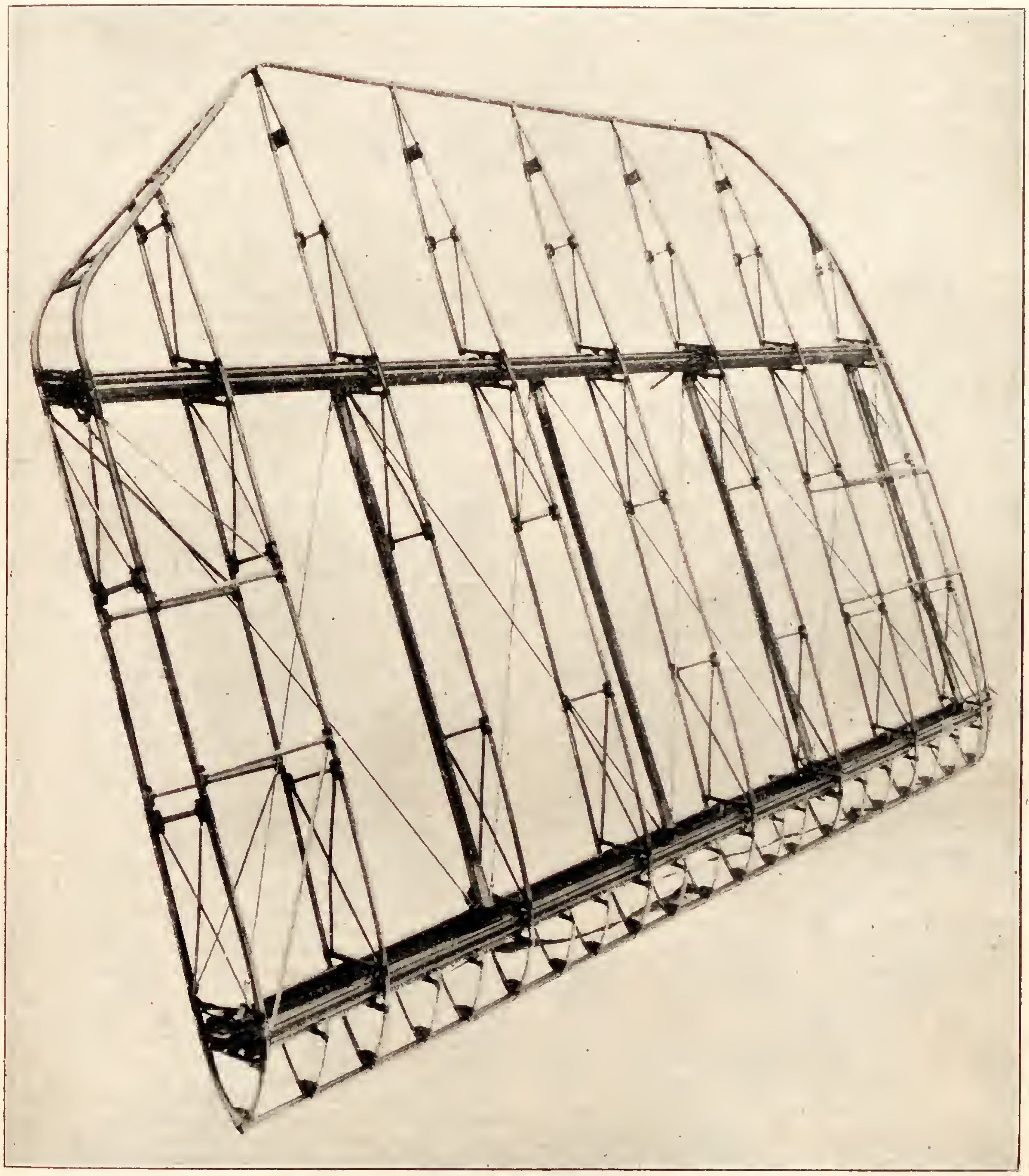
USE OF METAL FOR AEROPLANE CONSTRUCTION.

By F. M. GREEN, M.Inst.C.E., F.R.Ae.S.

In the early days of flying the problems of aerodynamics so occupied the experimenter that he paid little attention to the finer points of construction. Materials that were easy to obtain and quick to work up were used, and as a consequence practically all the first aeroplanes were made of wood with a minimum of metal fittings. It was soon discovered that silver spruce could be obtained at a low price as there was very little other use for it, and that this kind of timber had the maximum advantages for aeroplane construction. Its specific strength was high, it could be obtained in long pieces, and it is very straight-grained. Other forms of timber were used, and some of the early machines were made of bamboo. While this wood possesses the advantage of being hollow, it is difficult to join, and from the nature of the wood it would be impossible to make aeroplanes to drawing without using very wide limits. To the engineer, wood was an unusual material to use in places where it is highly stressed, and methods of calculation based on ordinary engineering practice had to be devised. The technique of design grew up very rapidly indeed, until at the present time there seems to be little chance of making a lighter structure for a given strength. The great convenience in the use of wood is that its low density enables comparatively thick sections to be used. From time to time suggestions have been made for the use of hollow wooden members built up of thin sections glued together. Unfortunately, the only practical method of joining wood together is by glueing, and it has been found in practice that the life of a wooden wing is the life of the glue. This makes the use of glued members for the main structure undesirable, as for reasons of safety a wing has to be scrapped as soon as the strength of the glued joint is in question.

Wood being a natural product, it is not possible to influence the strength and reliability to any marked extent, and it is, therefore, natural that the engineer turns to manufactured materials in which the process of manufacture can be regulated throughout all its stages. Good manufacture will ensure a uniformity which is completely out of the question in wood. Further than this, the physical properties of metals are continually being improved, and the limit of strength is probably a long way from being reached. Again, if reasonable precautions are taken, a structure can be made in metal that is unaffected by change of climate, and which will retain its strength and shape indefinitely.

The material that is used for the construction of metal aeroplanes is either steel in its various forms or one of the light alloys, the basis of which is generally aluminium, but which may in the future be magnesium. As the majority of aeroplanes are made for the purpose of war, it is of the utmost importance that the material chosen shall be one which can be obtained in the country in which the aeroplane is built. In this country steel is far more suitable than an aluminium



ALL-METAL AEROPLANE WING: With spars of corrugated steel strip, riveted together, and ribs of tubular construction, this wing was constructed by the Armstrong-Whitworth Company in 1920.

alloy. France, on the other hand, which is a large manufacturer of aluminium, has developed its metal construction almost entirely by the use of aluminium. Both steel and aluminium alloys have their own special advantages, and it is a difficult matter to decide which has the best chance of producing the lighter and more reliable structure. Both materials are likely to be improved considerably in the future, and it is not possible to say which will develop the faster.

It is always a difficulty in engineering to know what is the safe stress to which a material can be worked. Aeroplanes, unlike any other structure, are calculated on their ultimate strength, and not on a factor of safety on the normal load, as is usually the case. It appears at first sight that, as the aeroplane is calculated on its ultimate strength, it will be safe to use the ultimate strength of the various materials employed. Whether this is safe or not depends to a considerable extent on the type of material under consideration. It has been common practice to design mild-steel fittings on their ultimate strength, and the results seem to justify the practice. With heat-treated steels it is quite certain that the results will not be equally safe. It is certainly not necessary to work to as low a stress as is given by the limit of proportionality, neither is there any particular justification for taking the yield-point. As there seemed to be no scientific reason for settling the stress, it was necessary to find a practical method which agreed with observed results, and a stress known as the "proof stress" has been adopted. "Proof stress" is defined as that at which the strain is not greater than the elastic strain by more than a small amount. It must be clearly understood that the proof stress is merely a method of testing steel, and that its use can only be justified by practical experience. What we really want to know is the compressive strength of thin strip, and there is no practical method of measuring it. It is assumed that this bears a close relationship to the tensile strength, and, while this is not absolutely true, it certainly seems to give us a fairly good basis.

We are now in a position to make comparison of the three materials. It must be remembered that the comparison cannot be expressed exactly by a series of figures without reservation, as there are a number of other factors of which no account is taken. In an aeroplane structure there are usually a large number of comparatively long members in compression, and the strength of these depends largely upon the modulus of elasticity of the material used. This figure is curiously constant for steel of almost every kind, and can be taken as 29,000,000 lb./sq. in., while for Duralumin it is 12,000,000 lb./sq. in. For spruce the figure will vary from 1,100,000 to 1,900,000 lb. per square inch. The latest specification gives a value of 1,500.000 as a minimum.

Material.	Max. Stress, tons/sq. in.	Spec. Gravity.	Relative specific strength.	Mod. of Elas.	Relative specific stiffness.
Sitka spruce ...	2·24	0·45	0·71	1,500,000	0·86
Steel strip ...	55·0	7·85	1·00	29,000,000	0·96
Duralumin ...	14·5	2·85	0·73	11,000,000	1·00

The maximum stress for spruce is taken as 5,000 lb./sq. in. This is the figure for compression, the tension figure being considerably higher. As in practically every case the failure of a wooden member is by compression, this is a fair figure to take. The maximum stress for the steel and Duralumin is taken from the proof stress. It may be objected that a figure of 14·5 tons/sq. in. is rather low for Duralumin. This has been taken from a standard specification. It is probable that other light alloys might give better figures than this, but the same may be said of steel, and the figures used are meant to represent material that can be obtained commercially in quantity, and at a reasonable price. In the table given, the principal characteristics of the three materials are summarised. The fourth column gives a comparison of a relative strength for a given weight, and the last column the relative elasticity modulus, also on a weight basis. If the specific strength of steel is 1, then Sitka spruce is 71 per cent. as strong, and Duralumin 73 per cent. The last column can best be described as relative specific stiffness, and in this case Duralumin is slightly better than steel, and spruce not very much behind.

The conclusions from this table are, other things being equal, strip steel of 55 ton proof stress will make the lightest aeroplane of a given strength. This conclusion will only hold good if it is possible to arrange that the strip steel can actually develop a high percentage of its full proof stress. In tension this is a simple matter, but in compression owing to the thinness of the strip that must be used, it is only possible to develop the full proof stress when special precautions are taken to stiffen the section against secondary failure or "crinkle." Luckily this problem has proved capable of solution, as it has been found that longitudinal corrugations suitably arranged enable strip steel sections as thin as 12-thousandths of an inch thick to be stable under a compression stress exceeding the 55 tons per square inch.

At the Aero Show held in Paris in December of last year, it was interesting to notice that the Duralumin constructions, which were largely exhibited, were frequently made up of flat Duralumin strip. In certain cases the web was embossed, in other cases the flanges were corrugated. As the stress to which the Duralumin can be worked is comparatively low and the sections used are thicker, the need for stiffening the sections against secondary failure is not so urgent. The spars with no stiffening were mostly for planes with little or no bracing, while corrugations were used for spars in braced biplanes, in which more weight was put into the bracing and less into the spars themselves.

Theoretical considerations are of little value until they are confirmed by practice. Six years ago we could not have answered the question as to whether it was commercially possible to produce aeroplanes in metal as light and as strong as in wood. Today there are several standard aeroplanes in France made chiefly of Duralumin, notably the Breguet XIX, and in our own country the firm with which the writer is connected is manufacturing steel fighting aeroplanes in series for the Air Ministry. That the Breguet has a comparatively light structure weight is well known, and it is possible to say that "Siskin III" is no heavier than the lightest wooden aeroplanes made to a comparable specification.

Three years experience of Service flying has not shown any troubles that are peculiar to steel construction, while the expectation of increased durability, due to a stable material, has been justified. The minor troubles of warped trailing edges and twisted spars are unknown, and it is comforting to know that spare planes can be stored indefinitely without risk of deterioration. There is no doubt a valuable store of experience of Duralumin aeroplanes abroad; in this country it is limited to a number of experimental aeroplanes, but it would be interesting to hear from the constructors and users as to the success of the construction. Steel we have used in all kinds of engineering for a long time; the lighter alloys scarcely have the same experience behind them, and we need to add to this experience the collective reports of as many constructors and users as possible.

Hitherto, most of the aeroplanes that have been made in metal have been of comparatively small size. The sections used in this construction have, therefore, been light, and this has added a great deal to the designers' troubles. Ribs in particular have been found much more difficult to design than spars. It certainly is easier to make a rib in an aluminium alloy than in steel, as it is not at all easy to develop a high stress in the very light steel sections that must be used, and the writer has often been tempted to take the easier path. Greater confidence in the reliability of steel, and the fact that in the case of war it will be much easier to obtain, encouraged the intensive development of this particular unit, and a solution has been obtained.

One lesson we have learnt, and it has become more and more obvious as manufacturing developed. The lesson is the need for making up a wing in such a way that all components can be finished separately and erected quickly into a complete wing. The saving of floor space alone would justify the rejection of a design in which the ribs had to be built up in place. Apart from the saving of space, we have found it essential that all rivets should be closed under a press, and it is not easy to handle a partly completed wing so that rivets can be brought under a fixed press. In early designs portable rivet presses of various types were used, but one awkwardly-placed rivet often took as long to close as 50 which were more straightforward. In modern designs, spars and ribs are finished as units, and are fastened one to the other without the use of rivets. Leading and trailing edges are clipped to the ribs without rivets or bolts, and the whole assembly is easy to erect and easy to repair.

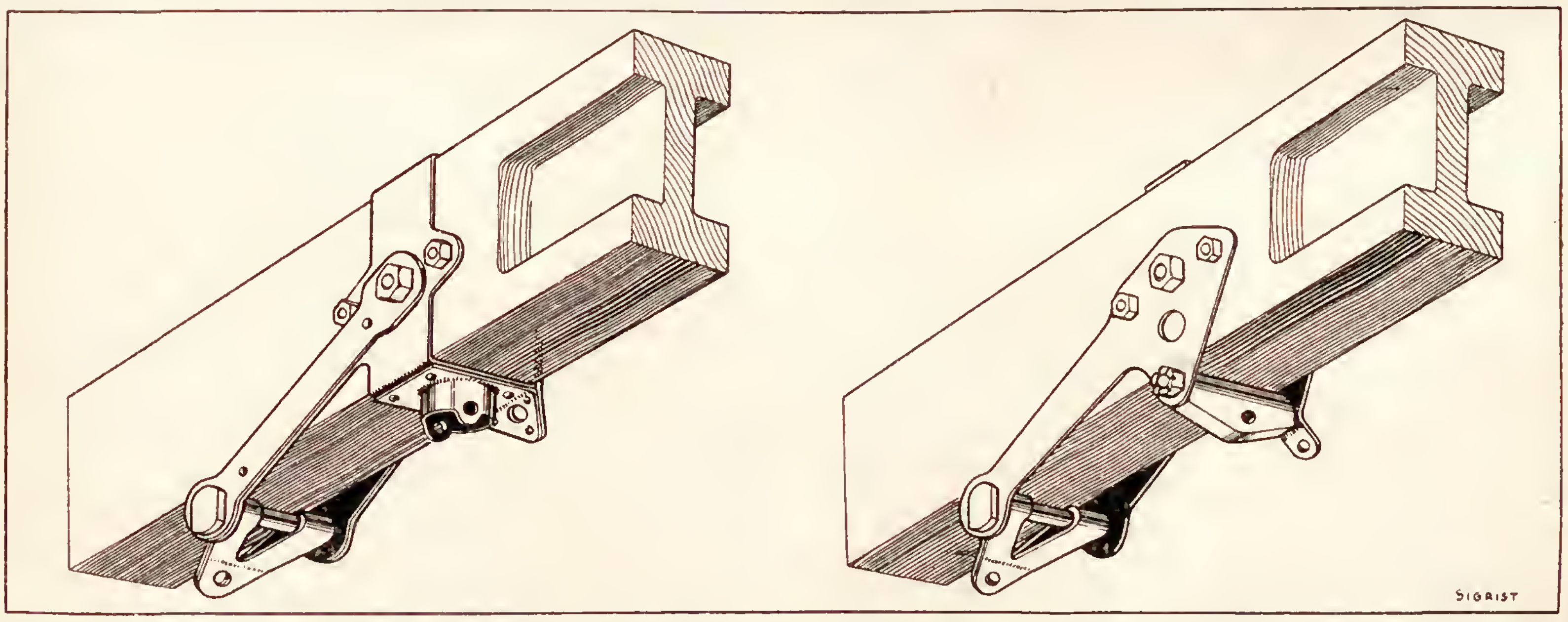
In the course of this article it is not proposed to go into detail methods of construction. Progress has been possible only by the closest co-operation between the drawing office and the shops, and it is only by the experience of making steel aeroplanes in series that the gradual improvement in type has been effected. We may perhaps be allowed to congratulate ourselves that it is in England that the steel aeroplane has found its first practical expression, and that our own fighting service is the first, and at present the only, Air Force, to be equipped with steel aircraft.

DESIGN FROM THE MANUFACTURING POINT OF VIEW.

By F. SIGRIST, M.B.E., A.F.R.Ae.S.

From 1910 to 1926 is a long span in the Aircraft Industry and represents a period in which evolution has accomplished considerable progress in the science of aerodynamics and aircraft design, but I occasionally wonder whether we have progressed from the manufacturing point of view in the same ratio, and on the whole I am inclined to think that the answer is in the negative. It must be borne in mind, however, that a concatenation of circumstances have mitigated somewhat against the manufacturing position in recent years. During the Great War, it was possible to utilise expensive jigs and tools to the fullest advantage and useful designs did not materialise so rapidly as they have since.

Taking the period 1919 to 1925, both engine and aircraft design have vastly improved in comparison with the 1914-1918 period ; so much so that design may be said to have been more or less in a state of flux, continuous research and resultant improvements aerodynamically rather tending to occupy the designers' mind to the exclusion of the manufacturing point of view. True, the numbers of each type of post-war machine in production have been comparatively small, but this fact, to my mind, emphasises the need for closer attention to manufacturing difficulties.



SIMPLIFIED WING FITTINGS : These sketches show, on the left, the original fitting and, on the right, the simplified fitting referred to by Mr. Sigrist.

I have consistently advocated the point that the draughtsman should be in a position to appreciate exactly what is involved in the manufacture of the part he designs, as aeronautical engineering is, in many respects, rather different from any other grade of engineering, and embraces so many varied vocations that I consider it almost essential for the D.O. man to have received a course of training in a practical aeronautical construction shop.

Co-operation.

I have found by long experience, that close co-operation between the designer, works engineer, and inspector is of the utmost importance in successful aircraft design, and regular consultations between these departments has done much to simplify our own designs, with consequent economy of manufacture and increase of output, but without minimising in the slightest degree the aerodynamical efficiency or performance of the finished product.

Standardisation for the whole industry is of course impossible beyond a certain point, *i.e.*, material specifications, A.G.S. parts, instruments, electrical equipment, &c., and this point having been reached, it remains for individual concerns to effect such procedure as may seem desirable to assist manufacture from their own standpoint. Circumstances of course vary to some extent with each separate firm, and in a brief résumé it is impossible to consider thoroughly such items as machinery, equipment, and scientific costing, but rather to the contrary, the question must be dealt with on broad outlines.

Where the manufacturer is concentrating on machines of the same type, say single-seater fighter machines only, or day-bombing machines only, the task of the designer is simplified, as he can nearly always arrange to use the same metal fittings on type II as on type I. but where, as in my own case, the manufacturer is engaged on two or three different types of machines, the designer is up against a difficult proposition.

Sheet-Metal Fittings.

Sheet-metal fittings offer scope for saving, particularly in the services of skilled labour. If the quantity required is sufficient to warrant the expense, press tools should certainly be employed, but the designer must remember that the indiscriminate use of these should be avoided, as the principle of their application is sometimes defeated. The considerations covering their use may be roughly classified in order of importance as—

(A) Reduction in the cost of production,
(B) Interchangeability,
(C) Accuracy of manufacture,

and these should be carefully studied.

Unfortunately, nowadays, orders are usually not of sufficient magnitude to justify the manufacture of press tools, but I have found, more particularly in the design of fuselage clips, that it is possible to evolve a fitting which can be blanked, bent, and utilised throughout the fuselage, provided some slight handwork in the shape of removing lugs is carried out where required on different points.

In the design of wing fittings a certain saving can be effected by careful thought. There is a tendency to produce a complicated fitting of light-gauge material, bent up and reinforced with plates and washers, riveted and brazed on, and lightened in a rather elaborate manner. Much work can be avoided if two simple flat plates of thicker gauge are used instead. The increase in weight is infinitesimal, but the saving in manufacturing cost is considerable. The flat plates can be nibbled out and filed up to template by unskilled labour, but the bent-up clip necessitates the use of bending blocks, skilled labour, and naturally takes a longer time to inspect. These instances can, generally speaking, be employed throughout the whole of the designing office. Simplicity is the keynote of successful design, and I am of the opinion that a certain amount of weight can be sacrificed without impairing efficiency to any appreciable degree, yet at the same time increasing ease of manufacture.

Riveting can be, and often is, carried to such an extent as to become an uneconomical process: lightening holes may seem trivial, but a saving can be made by careful design. Avoidance of complicated shapes and numerous small holes in hand-made fittings should be made a rule. Welding and brazing processes are useful up to a certain point, but it must not be overlooked that normalising must follow these operations, causing delay as apart from expense. The use of drop stampings, where quantities warrant the expense of dies, is a practice to be commended. Where a complicated profile is required on a machined fitting, a drop stamping will save considerable machining operations and simplify jigs and tools, beside conserving raw material.

High-tensile Materials.

The materials field affords many opportunities for the designer to assist the manufacturing side. I am not entirely satisfied with the use of high-tensile material. Undoubtedly, it possesses many advantages, and the designer, beset by the weight fetish, is sorely tempted to use it on every conceivable occasion, but in many instances the benefits to be derived are open to argument as to whether they are worth the expenditure. It is more difficult to work, and the heat treatment, apart from cost, necessitates test pieces and records, and careful following of batches through to shops to avoid confusion. With metal construction looming large in design, the use of high-tensile material is increasing, and, whilst certain features make it attractive, I am not convinced of its absolute superiority over other forms of metal construction. In the Hawker "Heron" I have refrained from using this steel, and have employed a mild-steel tubular construction throughout. I am not at liberty to enter into details, but I can say that the results from the cost and manufacturing point of view are startling, whilst the weight, strength, and performance figures are fully in accordance with expectations.

Duralumin.

The use of Duralumin to the best advantage is also open to question. Here again is another material which offers many attractions to the designer, but which presents manufacturing difficulties which detract somewhat from its good qualities. Our knowledge of the qualities of this material is not as complete as could be desired, and its use should be restricted wherever possible to plain fittings, where the minimum of working is required. Complicated bent fittings are to be avoided, as wherever the material is worked to any extent the heat treatment required is such that, apart from expense, it causes delay and often disorganisation, owing to the fact that it has to be repeated before the fitting is completed. In considering the non-ferrous metals, I think the designer is slightly handicapped by the necessity for adherence to specifications, but it is sometimes possible to obtain a concession to diverge. Constructors have experienced great difficulties in the past with sand castings, owing to blow-holes and porosity, and quantities have again not been sufficient to warrant the manufacture of dies. In the majority of cases the cause has possibly been due to inherent foundry trouble, but I have seen many instances where design has been at fault. The advantage of foundry advice when designing for castings is inestimable, and will result in a considerable saving. Where I have had difficulties with gun-metal and bronze castings as regards porosity, I have utilised hot brass stampings as being cheaper than die castings, and more reliable than sand castings, and even on small quantities a saving is shown, as scrap is practically nil. A material which the designer rather neglects is malleable iron, which is extremely useful on secondary structures. I recognise its limitations, but I have utilised castings with great success on gun-mountings and under-carriage fittings. It is cheaper and stronger than aluminium, and for replacing made-up plate fittings in certain structures, it is much better, the scrap being negligible.

A point, seemingly small, but one which I have found responsible for many irritating delays, is the fact that the designer, when considering such things as tanks, cowling, &c., does not give due regard to the standard size sheet of material available, and it is necessary to obtain specially large sheets, which as often as not, apart from delay in procuring, results in large scrap pieces being left over from each sheet, a wasteful proceeding which could be eliminated by a little forethought in the drawing office. It is also advisable for the designer to keep to standard gauges of thickness wherever possible and to avoid deviations from makers' usual stock sizes. As regards the question of screw threads, the designer must consider each case individually, as this is not so much a difficulty as regards manufacture, but is rather a question of general economy. On these grounds it is better to concentrate on standard sizes, as every new thread introduced means an increase, not only in screwing tackle, but in gauges for both works and inspection departments. On the timber side, there is not so much scope for assistance from designer to manufacturer, but the former must keep constantly in mind the question of quality and sizes of planks available. Economy is more a matter for judicious selection by the works rather than consideration by the designer.

In conclusion I regret that I can only touch on the fringe of what must be generally regarded as a most important question. The growing popularity of the aeroplane, the increasing tendency towards economy, the world-wide demand which is coming sooner or later for the best in aviation—British aircraft—makes closer co-operation between the designer, manufacturer and inspector a matter of paramount importance. No one realises more than I the necessity for research and progress, and no one welcomes with more enthusiasm each innovation which furthers our knowledge, but the application of such knowledge must be tempered with that consideration for our manufacturing facilities which will enable us to utilise it in the most efficient and economic manner.

DURALUMIN AS A MATERIAL FOR AIRCRAFT CONSTRUCTION.

By OSWALD SHORT.

For the purpose of all-metal aircraft construction, we have at the present time a choice of two materials, viz., steel, and the aluminium alloy known as Duralumin.

Other light alloys are in course of development, but as they are still in a more or less experimental stage, they need not be considered in this article.

It is proposed under this heading to give the results of experience in the use of Duralumin for aircraft construction, and in some places to make comparisons between this metal and steel as regards their suitability for certain work.

The use of Duralumin in this country as the main material of construction for aeroplanes, etc., as distinct from lighter-than-air craft, dates from the years 1918-19, when Short Bros. produced an all-metal aeroplane in which this material largely predominated.

Briefly, this machine had a *monocoque* fuselage made entirely of Duralumin, and plane ribs and covering of the same material. The spars, struts, and bracing wires, and the chassis struts were of steel.

Previous to the building of this machine, no serious attempt had been made in this counry to employ Duralumin for the construction of heavier-than-air craft, and this position was undoubtedly due to the fact that the metal was, by most designers, considered to be inconsistent in its properties, and too liable to corrosion to justify its use in this connection. What, perhaps, was forgotten in this judgment of the material, was the possibility that such observed failings were not wholly inherent to the alloy itself, but due to improper treatment, both in the manufacture of the metal and in its working up afterwards.

Experience since gained in the actual construction of aeroplanes, etc., has shown that Duralumin can be relied upon, providing that it is given at least the same careful treatment as is meted out to the high-tensile steels which are used for the same purpose. The question might be asked ; Why use Duralumin when it has been demonstrated that excellent machines can be made on an all-steel basis ?

The answer to the question is that Duralumin is applicable to certain desirable forms of aircraft construction to which steel is not applicable, at least as far as our present knowledge is concerned.

For instance, it is peculiarly applicable to the building of an all-metal *monocoque* fuselage, and such a type of fuselage may be said to be a desirable form of structure, because it provides at once an excellent stream line form, an interior devoid of obstructions, and an ideal form to withstand torsional loads, such as may be applied through the tail plane, fin and rudder. Such a fuselage avoids the use of fabric covering, does not absorb water, and can easily be made airtight, or fitted with the simplest made watertight or fireproof bulkheads. As a stream line form, it will maintain its shape against severe air pressures, and local pressures when on the ground. The photographs herewith show more clearly than can be described the clearness and simplicity of *monocoque* construction in metal.

Tail portion of a Short all-metal monocoque fuselage. The illustration gives an excellent idea of the cleanness of this form of construction.

Other desirable forms of structure, are *monocoque* flying boat hulls and seaplane floats. Indeed the *monocoque* system of construction is essential for such purposes, if the best results are to be obtained. It has been amply demonstrated that Duralumin hulls and floats are superior to wooden ones in that they are much lighter for a given strength and have the additional advantage that they do not absorb water, effecting a still greater saving in weight.

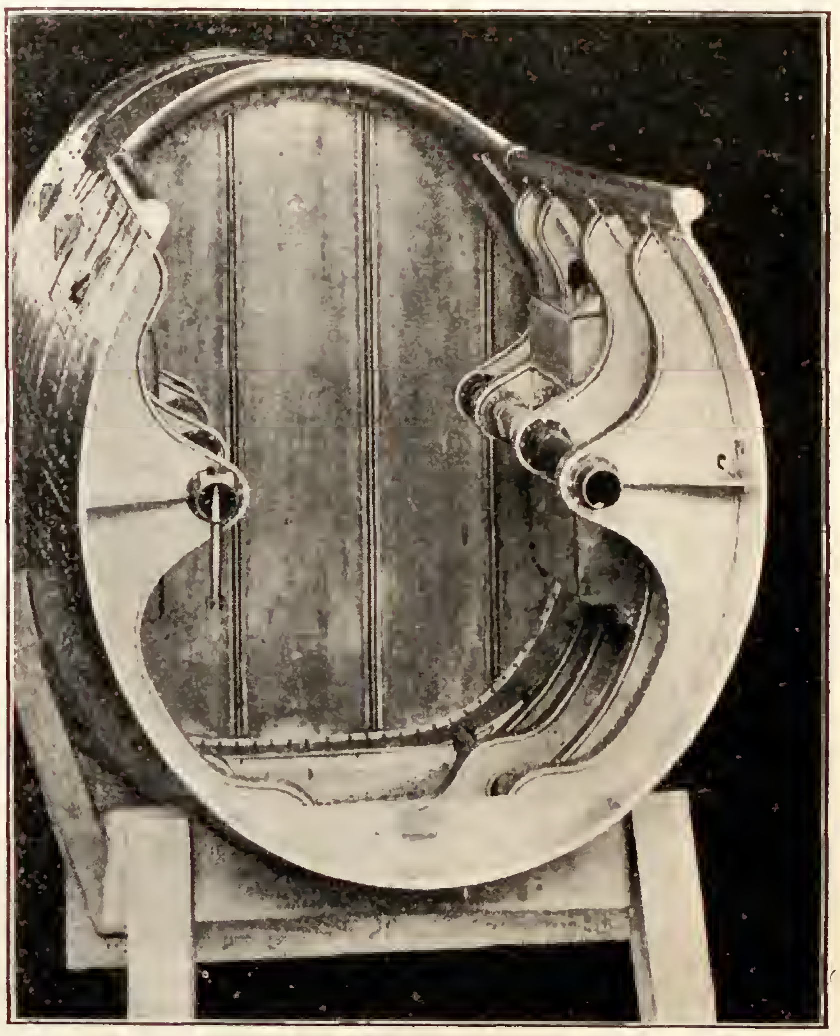
On the other hand, if we endeavour to make similar constructions of steel we are faced with great, and at present unsurmountable, difficulties. If steel were used in the same manner, because of the greater density of the metal, the plates, generally, would be too thin to suit the requirements of resistance to compression stresses, to say nothing of the difficulty of riveting the joints in such thin plates. In fact, if such structures are required to be constructed of metal, some form of light alloy is essential.

It is for this reason that many aircraft manufacturers in this country are now seriously studying the question of using light alloys in the manufacture of aircraft.

The following table shows the thickness of the Duralumin plating used by Short Bros. in the construction of their first all-metal flying boat, which was laid down in the early part of 1923, and, for comparison, the thickness of steel plating of the same weight per square foot.

As Built in Duralumin.		Thickness in Steel of Same Weight.
Steps 18 gauge ...	·048 in.	·017 in. 26 gauge approx.
Bottom other than steps	·028 in.	·010 in. 33 gauge approx.
Top	·022 in.	·008 in. 35 gauge approx.

The second table shows in a similar manner the thickness of plating used by Short Bros. in the construction of the first large flying boat with all-metal hull, supplied to the Air Ministry and delivered in 1924. This machine flew with an all-up weight of nearly 14,000 lbs.



This section through a Short all-metal fuselage shows the neat interior and the cradles or bulkheads for carrying various equipment.

As Built in Duralumin.		Thickness in Steel of Same Weight.
Steps and under water plating, 14 gauge	·080 in.	·025 in. = 23 gauge.
Remainder above water line, 20 and 22 gauge	·036 & ·028 in.	·013 in. and ·010 in., 29 and 33 gauge approx.

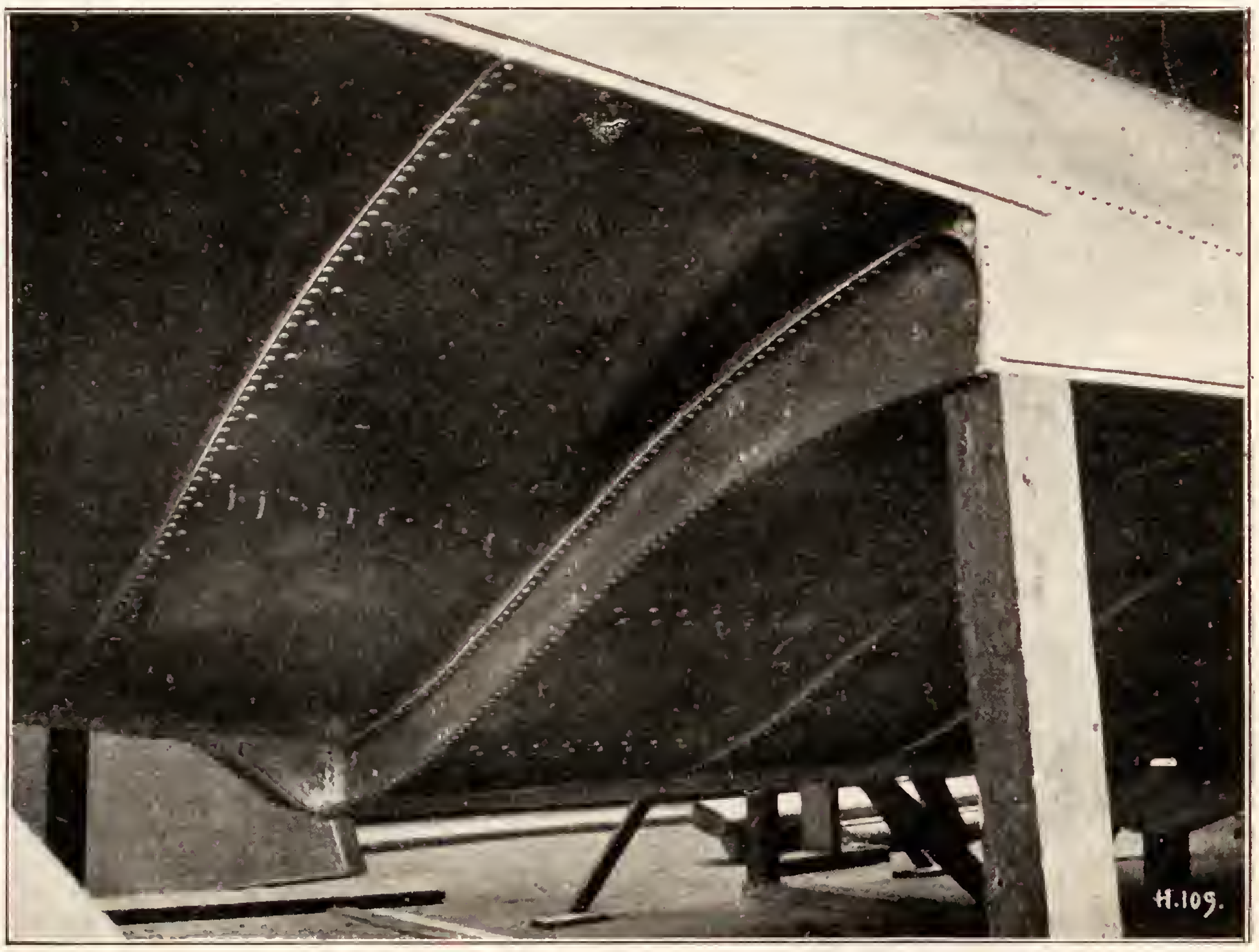
It will be seen from this table that the greater weight permissible in the under-water plating of the larger hull indicates that steel might possibly be used there, although the equivalent steel plating is still so thin as to make this a doubtful project, especially, where riveting is concerned. Also, it is evident that steel could not be used over the whole structure, and in this connection it must be borne in mind that it is not advisable to join dissimilar metals because of corrosive effects in the presence of salt water.

For the construction of the very large flying boat hulls which future developments may evolve, steel may be a possible material, but it will have to be proved that it possesses distinct advantages over its rival, because the lighter meta will always have the advantage of its extra thickness, which adds to its compressive strength and reduces the amount of internal stiffeners required inside the hull; thus reducing detail work and effecting a saving of labour costs.

In considering such future prospects, steel has an advantage in that it may be welded, if such a method of joining is found to be desirable, also it may be of the rustless variety.

On the other hand, we may reasonably expect that the science of metallurgy will make progress in the development of light alloys, eliminating the tendency to corrosion, and increasing its tensile and compressive strength. Already we have new alloys of considerable strength, and not much more than half the weight of aluminium, which even at the present time might be used for some secondary parts of aircraft.

But, to revert to the present uses of Duralumin, its application with advantage is not confined to the purely *monocoque* type of construction in metal. It possesses distinct advantages over steel for rib construction, because in such necessarily light parts, it can still be used in reasonably thick sections, which consequently can be of simpler and more reliable form than similar steel parts.



This photograph shows the step of the Short all-metal hull flying-boat "Singapore."

This fact regarding rib construction is becoming more and more recognised by builders of metal aircraft, and even those who have specialised in steel construction generally, are being attracted to light alloy for rib construction, because of the special advantage it possesses for this work.

When we come to the construction of main spars steel becomes more applicable, and the higher tensile steels have, perhaps, a slight advantage over Duralumin where lightness is the main consideration. Nevertheless, the use of a light alloy presents some advantages even in this case, and these may be stated as follows:—

The metal is easier to work and to form into shape. Where riveting is employed, the metal is more readily drilled or punched, and the rivet heads easier to form, leading to greatly-reduced labour charges. The sections of the spars also can be of simpler form, because the thicker sections of material which can be used are more stable in themselves, and this simplicity of form again leads to simplicity in strut fixings, etc.

One of the accompanying photographs shows a type of Duralumin main spar under test at Rochester, and the following figures give the results of this test, and the weight of the spar:—

Maximum test load, 4·8 times normal load, plus structure weight.
Maximum stresses realised in overhang, 38,000 lbs. per sq. in.
Maximum stress in inner bay, 40,200 lbs. per sq. in.
Removal of load showed a slight permanent set around the fitting, but no indications of the spar failing.
Maximum end load in inner bay, 33,000 lbs.
Maximum bending moment in overhang, 455,000 in.-lbs.
Weight of spar per ft. run, 4·25 lbs.

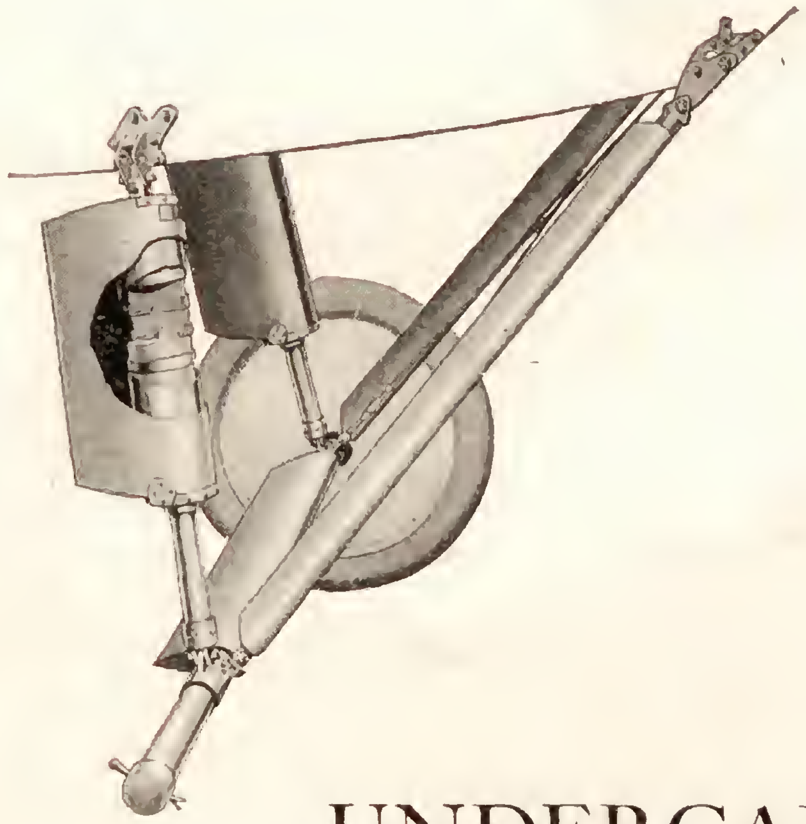
This particular spar is made up of laminated plates of Duralumin. One advantage among others is that the number of laminations can be reduced or increased as the strength requirements dictate. This spar is sufficiently stable to require no internal stiffeners, and has proved to be highly resistant to torsional loads. One advantage of using Duralumin is the ease with which it can be worked when in the annealed state—or if the work is of a simple nature—after normalising. The age-hardening of Duralumin after normalising is a very valuable feature, which is non existent so far as the writer is aware in any of the high-tensile steels. This property can be used to save the power required to form any simple shape, and the material will age-harden in the usual time afterwards, whereas with steel it needs annealing to enable the shape to be obtained, and must afterwards be heat-treated if its full strength is to be developed.

Metal Wing Coverings

When we come to consider the possibility of covering the surfaces of planes with metal, it is obvious that some form of light alloy is the only solution. Even with such a metal the sheeting has to be so thin as to offer difficulties in manufacture and application. Indeed, such disadvantages have up to the present more than offset the possible advantages to be gained. The successful application of metal covering is linked up with the possibility of making the covering the main strength member of the plane. Some progress has been made in this direction, in an experimental

This announcement is the fourth of a series dealing with

DESIGN & CONSTRUCTIONAL FEATURES OF DH AIRCRAFT.



UNDERCARRIAGES.

¶ Efficiency and Simplicity are the keynotes of the Shock Absorbing System used in the Undercarriages of all modern de Havilland types. Exhaustive tests, during which machines have even been "flown into the ground," have revealed that, while the shocks of landing are most effectively damped out, the apparatus requires a minimum of attention and no replacements.

¶ Impact is absorbed in the compression of rubber blocks by means of a piston working in a cylinder. The rubbers are separated by metal discs and, being protected from the action of light, are practically everlasting. The natural hysteresis of the rubber, combined with the friction of the sliding pistons and discs, provides rebound damping.

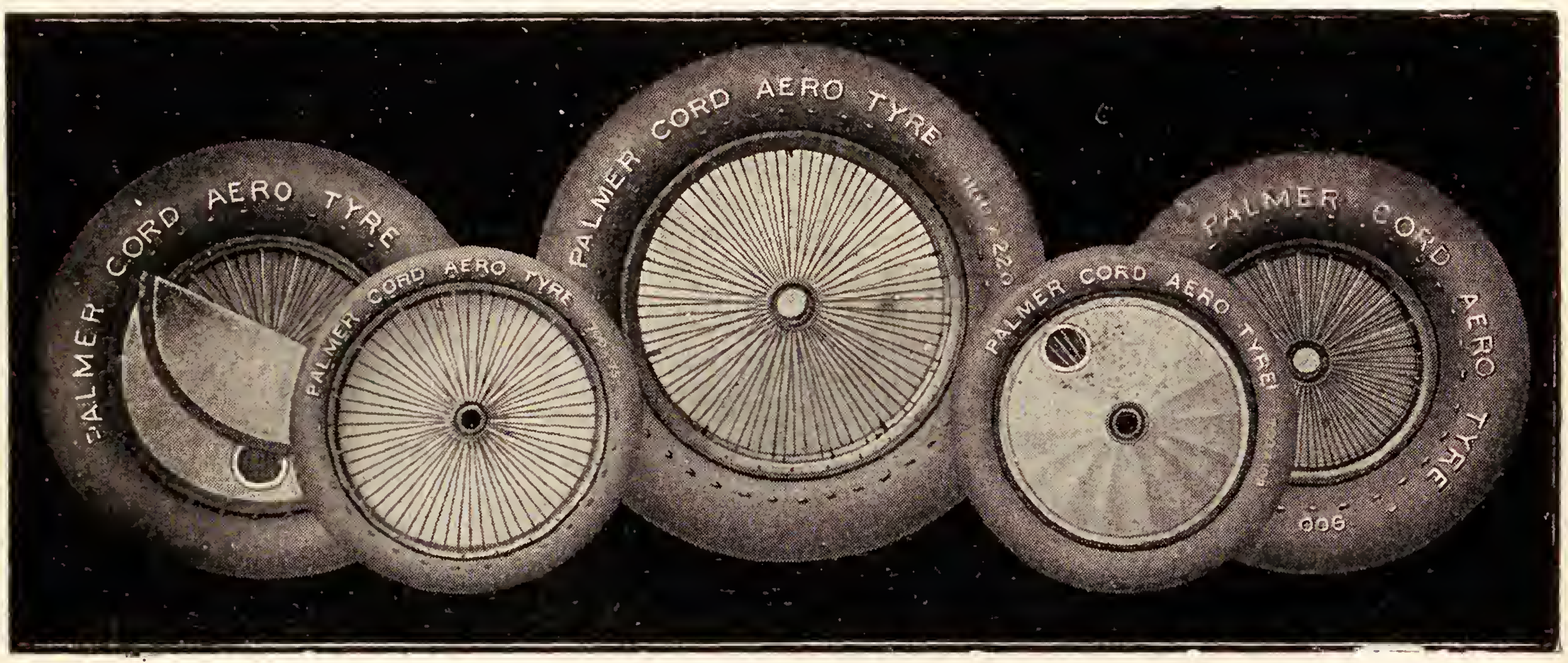
¶ The frontal area of this type of undercarriage is extremely small and the compression legs, radius rods and axle lend themselves to efficient streamlining.

¶ *A typical de Havilland undercarriage—that of the "MOTH"—is illustrated above in diagrammatic form, two of the rubber blocks being drawn in section to show the method of assembly.*

THE DE HAVILLAND AIRCRAFT CO., LTD.,
STAG LANE AERODROME, EDGWARE, MIDDLESEX.
Telephone: Colindale 6160-6163. *Telegrams:* "Havilland, Edgware."

PALMER

LANDING WHEELS and TYRES



STANDARD SIZES:

Tyre Size	Wheel No.	Hub		Track Line
		Length	Bore	
		m/m	m/m	m/m
375 × 55	168	111.12	25.4	Central
300 × 60	16	111.12	25.4	Central
450 × 60	30	89.	31.75	Central
„	172	130.	38.09	Central
575 × 60	21	160.	28.	Central
„	186	120.	34.92	Central
„	190	150.	38.09	Central
650 × 65	78	178.	44.45	132/46
„	79	178.	44.45	Central
„	100	178.	38.09	132/46
„	101	178.	31.75	132/46
600 × 75	21	160.	28.	Central
„	186	120.	34.92	Central
„	190	150.	38.09	Central
700 × 75	78	178.	44.45	132/46
„	79	178.	44.45	Central
„	100	178.	38.09	132/46
„	101	178.	31.75	132/46
700 × 100	77	178.	44.45	132/46
„	92	185.	55.	135/50
„	95	185.	55.	Central
„	99	178.	38.89	132/46
700 × 100	112	150.	38.09	Central
„	176	178.	44.45	Central
„	179	178.	55.	132/46
650 × 125	119	178.	55.	132/46
„	147	178.	55.	Central
„	188	120.	34.92	Central
750 × 125	77	178.	44.45	132/46
„	92	185.	55.	135/50
„	95	185.	55.	Central
„	99	178.	38.89	132/46
„	112	150.	38.09	Central
„	176	178.	44.45	Central
„	179	178.	55.	132/46
800 × 150	161*	185.	55.	135/50
„	162*	185.	55.	Central
„	163*	185.	66.67	135/50
„	169†	185.	55.	135/50
„	177	185.	55.	135/50
„	183	185.	55.	Central
„	211*	185.	60.32	135/50
1000 × 150	167	185.	55.	125/60
„	174	250.	80.	Central
„	182	185.	55.	Central
1000 × 150	187	220.	66.67	Central
„	201	185.	60.32	125/60
„	210	185.	60.32	Central
1000 × 180	148	220.	80.	Central
„	149	185.	55.	Central
„	155	220.	66.67	Central
„	166	185.	55.	125/60
900 × 200	107	185.	55.	Central
„	108	185.	55.	125/60
„	128	220.	66.67	Central
„	137	250.	80.	Central
„	157	185.	80.	Central
„	202	185.	60.32	Central
1100 × 220	134	220.	66.67	Central
„	136	250.	80.	Central
975 × 225	192	185.	60.32	Central
1250 × 250	133	250.	80.	Central
„	154	304.8	101.6	Central
1500 × 300	115	304.8	101.6	Central
„	126	304.8	152.4	Central
1750 × 300	139	400.	152.4	Central
„	191	350.	150.3	Central

* *Wheels Nos.* 161, 162, 163 *and* 211 *are of stronger type than the other wheels for* 800 × 150 *tyres.* † *Wheel No.* 169 *is fitted with Ball Bearings.*
Grease gun equipment is a standard fitting on all wheels of 700 × 75 *and upwards.*

THE PALMER TYRE LIMITED,

Contractors to The Admiralty, The War Office, and The Air Ministry,

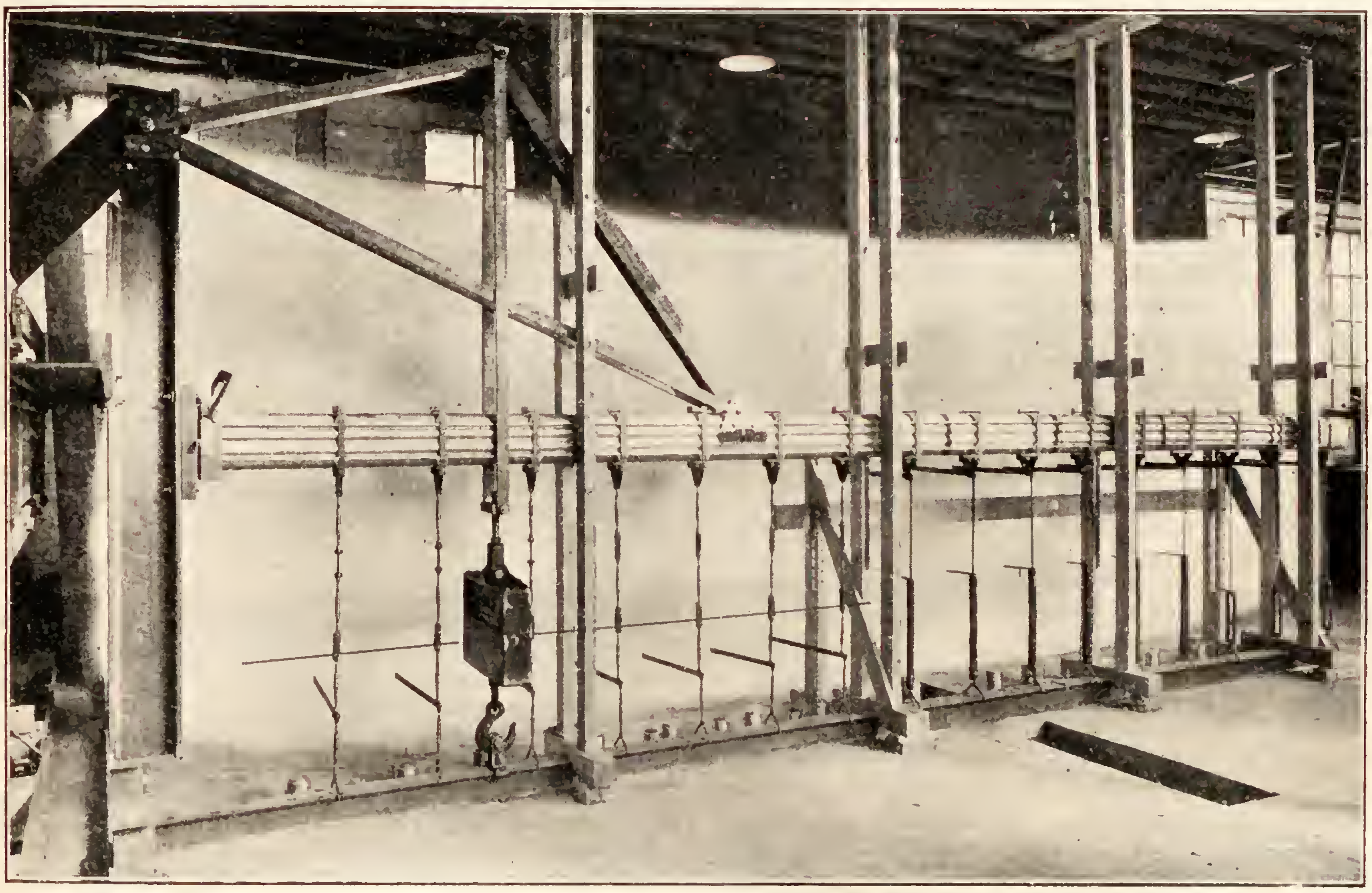
100-106, CANNON STREET, LONDON, E.C.4.

Telegrams: "TYRICORD, CANNON, LONDON." PARIS: 31, Rue la Boétie. Telephone: CITY 1477 (2 Lines).
U/ND (343)

form, and if it can be developed to an entirely successful conclusion, the advantage of rigid and non-water-absorbing plane surfaces should lead to improved performance and the longer life of the planes. Light alloys open up, therefore, an interesting field of development, which is barred to metals of much greater specific gravity.

Corrosion.

Nothing has done more to retard the development of light-alloy aircraft construction in this country than the one word "corrosion." We have become familiar with the word rust from childhood, and equally we have come to take it for granted that its effects are not so serious as to deny to us the use of the metals subjected to it. The word "corrosion" has a more fearsome sound, yet the two words have the same meaning and may be applied alternatively. Some metals corrode more rapidly than others, but in any case, certain definite conditions are required to bring about this phenomenon. The prevention of corrosion consists in avoiding these conditions as far as is possible. The composition of the metal itself is important. The composition and treatment of Duralumin has made it less prone to corrosion than the metal aluminium which forms, perhaps, 93 per cent. of its composition. Rustless steel is a further example of this fact, and indicates one line of research to which metallurgists are, of course, quite alive, and in which we may expect progress to be made. Corrosion may be said to be due to electrolytic action, and the presence of an electrolyte in contact with the metal is a condition of the process of corrosion, where the cause is external. If the electrolyte can be insulated from the metal, corrosion is prevented. The writer does not profess to have a knowledge of the intricate processes connected with the problem of electrolyte action, a phenomenon which is indeed a long way from being completely understood even by those whose work involves a special study of the subject. Nevertheless, the above remarks show the nature of the problem as it affects the aircraft manufacturers who use metal for construction purposes. The writer's experience of Duralumin in connection with the machines built by Short Brothers, and the numerous experiments carried out at our Rochester works, extending over nine years, on samples of steel and Duralumin, is as follows :—



A Short Duralumin spar on test. Built up from corrugated strips, this wing spar showed excellent strength qualities. Under a load 4·8 times normal, maximum stresses of about 40,000 lbs. per square inch were realised. The weight of the spar was 4·25 lbs. per foot run.

Duralumin, without protective covering of any kind, exposed for long periods to ordinary atmospheric conditions, compares very favourably, so far as corrosive effects are concerned, with the ordinary high-tensile steels used in aircraft manufacture ; the latter, indeed, appear to suffer far more severely than the former under such conditions. A long series of tests also seem to indicate that with similar unprotected plates immersed in sea water the light alloy is less affected than is the steel of the non-rustless variety. When Duralumin is protected with a suitable paint and exposed to atmospheric conditions, it appears to suffer no deterioration whatever even after several years' exposure, and one is led to the conclusion that under these conditions Duralumin may be expected to outlast wood and ordinary high-tensile steels, as used in aircraft manufacture.

When a Duralumin hull or floats are protected in a similar manner, the coating appears to be effective in preventing serious corrosion, so far as tests of 12 and 15 months go to prove. In parts immersed in sea water, care must be taken to keep the protective covering intact by repainting any abrasions, the part having first been carefully washed with fresh water, to remove any traces of salt on the metal. Care must be taken also in the treatment of the metal in the process of manufacture ; where a salt bath is used for annealing and normalising purposes the metal must be thoroughly cleansed, and running warm water has been found to be most effective for this purpose. The use of a suitable electric furnace for heat treatment will, of course, dispense with any necessity for this washing process. Such furnaces are being used in France, where the manufacture of Duralumin spars and fuselages is being carried out on a production basis.

TECHNICAL LITERATURE.

A.R.C. REPORTS.

THE DESIGN OF PITOT-STATIC TUBES.

By E. OWER, B.Sc., A.C.G.I., and F. C. JOHANSEN, B.Sc. R. & M. No. 981 (Ae. 194). (12 pages and 11 diagrams.) August, 1925. Price 9*d*. net.

Methods of air measurement are important for a large number of industries, and, in fact, in any factory or other place in which fans are used to create a draught of air for ventilation. There are many methods of measuring this flow of air, but the instrument known as the pitot-static tube gives more accurately than any other method the correct velocity of air flow.

There is little detailed information available on the characteristics of these so-called pitot-static tubes, which consist of an open-ended tube facing the wind with holes situated in a concentric tube aft of the open end. Both openings are normally connected to the ends of a water gauge, and the pressure difference gives a reading proportional to the square of the velocity of air flow.

Experience with the N.P.L. standard instrument has shown that, although it is very accurate when used under appropriate conditions, it suffers from certain defects. In order to design an instrument in which these undesirable features were eliminated, a research was conducted in a wind tunnel, when the following general conclusions were reached :—

The static holes in the concentric tube should be at least six diameters back from the base of the head, and the supporting stem at least 15 diameters down wind from the holes. In these circumstances the calibration of the instrument will be within wide limits independent of the shape of the head used, and will consequently be insensitive to relatively large variations in the form of the nose. Considerable latitude in the manufacture of duplicates will therefore be permissible without entailing the necessity for these to be calibrated. Further, an error not exceeding 0·25 per cent. on velocity will be incurred (in place of 0·7 per cent. with the existing standard) if an instrument of this type is used in which the stem is absent. From both aerodynamic and mechanical considerations a hemispherical nose appeared to be the most suitable, and this was incorporated on the modified form of instrument developed as a result of the research. The tests on this instrument gave satisfactory results ; its calibration was found to be 0·3 per cent. on velocity higher than that of the standard, and it was markedly less sensitive than the latter to angular deviations of the wind direction.

CLOSED-VESSEL EXPLOSIONS OF MIXTURES OF AIR AND LIQUID FUEL (PETROL, HEXANE AND BENZENE) OVER A WIDE RANGE OF MIXTURE STRENGTH, INITIAL TEMPERATURE AND INITIAL PRESSURE.

By R. W. FENNING.

R. & M. No. 979 (E.15). (29 pages and 16 diagrams.) September, 1925. 2*s*. 6*d*. net.

One of the outstanding difficulties in the development of the internal-combustion engine is the occurrence of "knock" at high compression ratios. The present report deals with an exploration of the phenomenon with various fuel-air mixtures and is a continuation of the previous work of this kind on air-hydrogen explosions in closed vessels (see R. & M. 902). In these closed vessel experiments the initial temperature and initial pressure of the charge were varied independently and the air-hydrogen mixture of the previous experiments was replaced by air-petrol, air-hexane, and air-benzene.

The effect of varying the air-fuel ratio over a large range (19 : 1 to 9 : 1), of varying the initial temperature from 100° to 230° C. (or 300° C. in the case of benzene), and of making additions of exhaust gas and water vapour to some of the air-fuel mixtures, was determined.

At 100° C. initial temperature rich mixtures of all three fuels give rise to a "knock," the intensity of which increases with decrease in the air-fuel ratio. For normal air-petrol and air-hexane mixtures the maximum pressure rise given by charges of the same density is unaffected by a large change in initial temperature from 100° to 200° C., but the explosion time is shortened.

With normal mixtures of all three fuels the explosion time diminishes with increase in initial temperature and increases with increase in charge density. Raising the initial temperature of normal air-petrol and air-hexane mixtures leads to "knock" of increasing intensity, the "knock" first appearing at the upper charge density and extending to the lower densities as the initial temperature is further increased.

The reduction of maximum pressure due to the addition of a small quantity of "exhaust gas" is slightly less than the percentage of "exhaust gas" in the charge, whereas the explosion time is much increased. Water vapour additions to a normal air-hexane mixture have a similar effect, although in this case the percentage reduction in maximum pressure tends to become slightly greater than the percentage of added water vapour in the charge.

The addition of about 6 per cent. of "exhaust gas" to a normal air-hexane mixture has but little effect in suppressing "knock" at 230° C. initial temperature.

A COMPARISON OF MODEL AND FULL-SCALE PERFORMANCE OF THE BRISTOL FIGHTER, USING FLIGHT-LIEUT. CAPON'S METHOD OF PRESENTATION. R. & M. No. 983 (Ae. 195). September, 1925. 4*d*. net. By E. F. Relf, A.R.C.S.C.

Another report, R. & M. 985, by Flight-Lieut. Capon describes a new method of reduction of aircraft performance tests. This method has been used in the present note to compare the results of tests on a 1/5th scale Bristol Fighter model with airscrew running, and of the full-scale performance trials carried out by Captain G. T. R. Hill at three heights and with full throttle. It would appear that the performance as predicted from the model experiments and that measured in flight are in agreement for the Bristol Fighter within the accuracy of measurement.

These Reports can be obtained from H.M. Stationery Office, Kingsway, W.C. 2.

The Rigid Airship.

With the resumption of rigid airship construction work in this country, the problems of airship structural design have once more become pressing, and any work which may help to throw light on the subject should be welcomed. When, as in the case of the book entitled "The Rigid Airship" by E. H. Lewitt, B.Sc., M.I.Ae.E., A.M.I.Mech.E., Lecturer in Engineering at the City and Guilds (Engineering) College of the Imperial College of Science and Technology, S. Kensington, published by Sir Isaac Pitman & Sons, Ltd., Price 30*s*. net, the work is of a really comprehensive nature, it is all the more valuable, and the book which Mr. Lewitt has given us should help very materially those who desire to take up the subject of rigid airship design, even if it does not, perhaps, present any information that is really new. The data collected together form an excellent textbook on the very complicated subject of airship hull design, and even those who have had some experience of this class of work will find in this book much to interest and assist them.

As the author points out in his preface, the rigid airship presents a type of structure which has not previously occurred in engineering, and consequently many fresh problems in engineering design have appeared. The book is written, the author states, on the results of experience gained while engaged on the design of rigid airships at the Bedford works of Short Brothers and at the Air Ministry. It is intended for the use of designers and aeronautical students, and it is assumed that the reader has a knowledge of engineering principles "up to the standard of a university degree." It deals with the structural design and performance only, and no attempt has been made to deal with engines and machinery. The analytical solutions, experimental results, suggested approximations, and performance equations given are due to Mr. Lewitt, who has already published some of them elsewhere. The method of treatment throughout has been to approach each problem mathematically and to compare the results so obtained with actual experience.

WORLD'S RECORDS IN AVIATION

In Flight for January 29, 1925, we published a complete list of the World's aviation records as standing on December 31, 1924. Since then several of these records have been beaten and in many cases have, as far as the nationality of the holders is concerned, changed hands. It will hardly be necessary for us to repeat here those records that stand the same now as for 1924, but we publish below a list of the new records, as standing on December 31, 1925. Thus any particular class not given below may be taken to be still unbroken and as published in our previous list.

Class C (Power-Driven Aeroplanes)

(*b*) *Records without Refuelling.*

Distance, Non-Stop.—4,400 kms. (2,728 miles) ; France, Drouhin and Landry, on Farman, 450 h.p. Farman, at Etampes-Chartres, August 7-9, 1925.

Duration, Non-Stop.—45 hrs. 11 mins. 59 secs. ; France, *as above.*

Distance, Non-Stop, Cross-Country.—3,166 kms. (1,963 miles) France, Capts. Arrachard and Lemaître, on Breguet 19 B-2, 480 h.p. Renault, Etampes-Villa Cisneros, February 3-4, 1925.

Speed (Ground Level).—100 kms. (62·14 miles) :—401·279 k.p.h. (248·8 m.p.h.) ; U.S.A., Lieut. C. Bettis, on Curtiss R.-3C-1, 600 h.p. Curtiss, at Mitchel Field, October 12, 1925.

200 kms. (124·2 miles) :—400·687 k.p.h. (248·41 m.p.h.) ; *as above.*

1,000 kms. (621·4 miles) :—248·296 k.p.h. (153·9 m.p.h.) ; France, Fernand Lasne, on Nieuport-Delage 42 C.1, 500 h.p. Hispano-Suiza, at Villesauvage, August 29, 1925.

1,500 kms. (932·1 miles) : 218·827 k.p.h. (135·67 m.p.h.) ; France, Fernand Lasne, on Nieuport-Delage 42 C.1 500 h.p. Hispano-Suiza, at Villesauvage, September 12, 1925.

2,000 kms. (1,242·8 miles):—218·759 k.p.h. (135·63 m.p.h.), *as above.*

Records with 250 *kgs.* (551·2 *lbs.*) *useful load.*

Speed.—100 kms. (62·14 miles) :—281·030 k.p.h. (174·2 m.p.h.) : France, Fernand Lasne, on Nieuport-Delage 42 C.1, 500 h.p. Hispano-Suiza, at Etampes, October 7, 1925.

200 kms. (124·2 miles) :—279·720 k.p.h. (173·4 m.p.h.) ; *as above.*

500 kms. (310·7 miles) :—249·618 k.p.h. (154·7 m.p.h.) ; France, Fernand Lasne, on Nieuport-Delage 42 C.1, 500 h.p. Hispano-Suiza, at Etampes, September 1, 1925.

Records with 500 *kgs.* (1,102 *lbs.*) *useful load.*

Speed.—100 kms. (62·14 miles) :—281·030 k.p.h. (174·2 m.p.h.), France, Fernand Lasne, on Nieuport-Delage 42 C.1, 500 h.p. Hispano-Suiza, at Etampes, October 7, 1925.

200 kms. (124·2 miles) :—279·720 k.p.h. (173·4 m.p.h.) ; *as above.*

500 kms. (310·7 miles) :—249·618 k.p.h. (154·7 m.p.h.) ; France, Fernand Lasne, on Nieuport-Delage 42 C.1, 500 h.p. Hispano-Suiza, at Etampes, September 1, 1925.

Records with 1,000 *kgs.* (2,205 *lbs.*) *useful load*

Duration.—3 hrs. 3 mins. 30⅕ secs. :—Holland, B. Grasé, on Fokker F.7, 400 h.p. "Liberty," at Schiphol, July 27, 1925.

Distance.—200 kms. (124·2 miles) ; France, Fernand Lasne, on Nieuport-Delage 42 C.1, 500 h.p. Hispano-Suiza, at Etampes, October 16, 1925.

Speed.—100 kms. (62·14 miles) :—246·440 k.p.h. (152·7 m.p.h.) ; France, Fernand Lasne, on Nieuport-Delage 42 C.1, 500 h.p. Hispano-Suiza, at Etampes, October 16, 1925.

200 kms. (124·2 miles) :—244·864 k.p.h. (151·8 m.p.h.) ; *as above.*

Records with 1,500 *kgs.* (3,307·5 *lbs.*) *useful load*

Duration.—3 hrs. 3 mins. 30⅕ secs. :—Holland, B. Grasé, on Fokker F.7, 400 h.p. "Liberty," at Schiphol, July 27, 1925.

Altitude.—5,516 m. (18,092·4 ft.) ; Italy, G. B. Bottala, on F.I.A.T. BR-1, 700 h.p. Fiat A-14, at Turin, December 23, 1924.

Records with 2,000 *kgs.* (4,410 *lbs.*) *useful load*

Duration.—2 hrs. 19 mins. 16⅖ secs. ; France, L. Borssoutrot, on super-Farman Goliath, (4) 500 h.p. Farman, at Le Bourget, November 12, 1925.

Altitude.—4,990 m. (16,367·2 ft.) ; *as above.*

Records with 3,000 *kgs.* (6,615 *lbs.*) ; *useful load.*

Duration.—2 hrs. 19 mins. 16⅖ secs. ; *as above.*

Altitude.—4,990 m. (16,367·2 ft.) ; *as above.*

Records with 4,000 *kgs.* (8,820 *lbs.*) *useful load*

Duration.—2 hrs. 19 mins. 16⅖ secs. ; *as above.*

Altitude.—4,990 m. (16,367·2 ft.) ; *as above.*

Records with 5,000 *kgs.* (11,025 *lbs.*) *useful load*

Duration.—1 hr. 12 mins. 21 secs. ; France, L. Bossoutrot, on super-Farman Goliath, (4) 500 h.p. Farman, at Le Bourget, November 16, 1925.

Altitude.—3,586 m. (11,762 ft.) ; *as above.*

Records with 6,000 *kgs.* (13,230 *lbs.*) *useful load*

Duration.—1 hr. 12 mins. 21 secs. ; *as above.*

Altitude.—3,586 m. (11,762 ft.) ; *as above.*

Class Cbis (Seaplanes)

(*b*) *Records without re-fuelling*

Duration.—28 hrs. 36 mins. 27 secs. ; U.S.A., Lieuts. Shildauer and J. R. Kyle, on P.N.9 flying boat, (2) 500 h.p. Packard, at Philadelphia, May 1-2, 1925.

Speed.—(Ground level) :—395·439 k.p.h. (245·1 m.p.h.) ; U.S.A., Lieut. J. H. Doolittle, on Curtiss seaplane, 600 h.p. Curtiss, at Baltimore, October 27, 1925.

100 kms. (62·14 miles) :—377·829 k.p.h. (234·2 m.p.h.) ; *as above.*

200 kms. (124·2 miles) :—377·158 k.p.h. (233·8 m.p.h.) ; *as above.*

Records with 250 *kgs.* (551·2 *lbs.*) *useful load*

Altitude.—5,831 m. (19,125·6 ft.) ; Italy, Lieut. Adriano Bacula, on Savoia S58, 300 h.p. Hispano-Suiza, at Sesto Calende, August 25, 1924.

Speed.—100 kms. (62·14 miles) :—168·523 k.p.h. (104·4 m.p.h.) ; Italy, Guido Guidi, on Dornier-Wal 33, "Idaor," (2) 260 h.p. Rolls-Royce, at Pisa, February 4, 1925.

200 kms. (124·2 miles) :—168·523 k.p.h. (104·4 m.p.h.) ; *as above.*

500 kms. (310·7 miles) :—168·523 k.p.h. (104·4 m.p.h.) ; *as above.*

Records with 500 *kgs.* (1,102 *lbs.*) *useful load*

Speed.—100 kms. (62·14 miles) :—168·523 k.p.h. (104·4 m.p.h.) ; *as above.*

200 kms. (124·2 miles) :—168·523 k.p.h. (104·4 m.p.h.) ; *as above.*

500 kms. (310·7 miles) :—168·523 k.p.h. (104·4 m.p.h.) ; *as above.*

Records with 1,000 *kgs.* (2,205 *lbs.*) *useful load*

Distance.—507·380 kms. (2512·8 miles) ; *as above.*

Altitude.—4,053 m. (13,293·8 ft.) ; France, Paumier, on F.B.A.-Louis Schreck, 500 h.p. Hispano-Suiza, at Argenteuil, December 5, 1925.

Speed.—100 kms. (62·14 miles) ; 168·523 k.p.h. (104·4 m.p.h.) ; Italy, Guido Guidi, on Dornier-Wal 33, "Idaor," (2) 260 h.p. Rolls-Royce, at Pisa, February 4, 1925.

200 kms. (124·2 miles) ; 168·523 k.p.h. (104·4 m.p.h.) ; *as above.*

500 kms. (310·7 miles) ; 168·523 k.p.h. (104·4 m.p.h.) ; *as above.*

Records with 1,500 *kgs.* (3307·5 *lbs.*) *useful load*

Duration.—3 hrs. 33 mins. 35 secs. ; *as above* (February 10, 1925).

Distance.—507·380 kms. (2,512·8 miles) ; *as above* (February 10, 1925).

Altitude.—3,682 m. (12,076·9 ft.) ; *as above* (February 4, 1925).

Speed.—100 kms. (62·14 miles) : 168·523 k.p.h. (104·4 m.p.h.) ; *as above.*

200 kms. (124·2 miles) :—168·523 k.p.h. (104·4 m.p.h.) ; *as above.*

500 kms. (310·7 miles) :—168·523 k.p.h. (104·4 m.p.h.) ; *as above.*

Records with 2,000 *kgs.* (4,410 *lbs.*) *useful load*

Distance.—253·690 kms. (157·6 miles) ; *as above* (February 9, 1925).

Altitude.—3,006 m. (9,909·6 ft.) ; *as above* (February 4, 1925).

Speed.—100 kms. (62·14 miles) :—133·781 k.p.h. (82·9 m.p.h.) ; *as above* (February 9, 1925).

200 kms. (124·2 miles) :—134·514 k.p.h. (83·4 m.p.h.) ; *as above* (February 9, 1925).

Class D (Gliders)

Duration.—10 hrs. 19 mins. 43⅖ secs. ; France, Comm· Massaux, on Poncelet Vivette, at Vauville, July 26, 1925.

NOTICES TO AIRMEN

The Air Navigation (Amendment) Order, 1925

It is notified :—

1. Attention is drawn to the fact that the Air Navigation (Amendment) Order, 1925 (S.R. & O., 1925, No. 1260, dated December 16), entered into force on January 1, 1926. The Order is obtainable, price 3*d.* net, from H.M. Stationery Office, Adastral House, Kingsway, W.C. 2, or through any bookseller.

2. This new order amends a considerable number of the provisions of the Air Navigation (Consolidation) Order, 1923. The principal amendments are summarised as follows :—

(i) A provision of the principal Order under which the requirements as to registration, certification as airworthy, and the carriage of certain documents do not apply to aircraft flown for the purpose of experiment or test only within three miles of a licensed or Air Ministry aerodrome, or of an aircraft factory, is modified so as to extend this exemption to aircraft flown in accordance with directions or special permission in writing given by the Secretary of State.

(ii) A fixed balloon shall not be flown except with the special permission in writing of the Secretary of State.

(iii) No person while intoxicated may enter or be in any aircraft.

(iv) The existing provision as to dropping of articles from aircraft is revised so that proceedings may be taken even where the actual person who dropped the article is unknown.

(v) The Secretary of State is empowered to issue directions as to carriage of W/T apparatus and operators, and the W/T service to be maintained.

(vi) The provisions of Schedule II of the principal Order regarding the examination before flight of aircraft carrying passengers for hire or reward are revised.

(vii) The zone in which the aerodrome circuit rules apply is extended to 3,500 yards from the perimeter of the aerodrome.

(viii) The zone in which aerial acrobatics are prohibited at public aerodromes is increased from 2,000 to 4,000 yards from the perimeter of the aerodrome. Aerial acrobatics in this zone are not, however, prohibited above 6,000 ft.

(ix) The rules for renewals of pilots' licences are revised.

(x) Certain amendments have been made in the prohibited areas (Schedule VII of the principal Order).

3. In connection with the amendment of the requirements regarding examination of aircraft before flight (Schedule II, paras. 8-10, of the principal Order), opportunity is now taken to point out, as there appears to be misconception in this matter, that the provisions of paragraph 8 of Schedule II as to inspection and certification of flying machines by a ground engineer before flight relate only to aircraft carrying passengers or goods for hire or reward, and not to private aircraft.

(No. 1 of 1926.)

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Civil Aviation in Ireland

The Committee of the Irish Aero Club held their first weekly meeting in the Hibernian Hotel, Dublin, on January 18, Sir James Percy presiding.

The Chairman said there was not a shadow of doubt that aviation was coming into its own, and the sooner they in Ireland put forward something definite the better for all concerned, and he believed that a lot of people would join and support them. The aeroplane was more advanced today than the motor car, in its sphere, was 20 years ago. So congested had the roads now become that many people were anxious to get away from the dust and traffic.

Senator Oliver Gogarty suggested appointing a deputation to approach the Government on the matter. There was a hangar at their disposal at Baldonnel Aerodrome. A proposal had been made that repairing be done at cost price by the civilian mechanics in the Irish Army in the hangar repair shops.

They needed to draw up certificates of airworthiness, continued Senator Gogarty, but it was necessary to learn how far that would be tolerated by the Government.

The question of Government grants to support aviation clubs in obtaining machines is also to be taken up with the Government at an early date.

It was decided that an interview be arranged with the Government, and the Committee formed a deputation to put forward the case for the establishment of clubs. There is every reason to anticipate a favourable reception for the proposals of the Aero Club, but the Irish Treasury will need to be assured that there is every prospect of success before disbursing financial assistance in any shape or form. For the Committee it must be said that it is very optimistic, and believes that marked progress will be seen in a short while, ever realising, of course, that the flying spirit must be cultivated.

New Transatlantic Flight—Plans for Irish Air Force Attempt

Plans for a transatlantic attempt are now rapidly taking shape in the Irish Air Force. A three-engined British aeroplane, carrying two pilots and a navigator belonging to the Irish Free State Air Force, is to ascend from Clifden, Co. Galway, in July next in an attempt to fly non-stop to Newfoundland.

The technical advisers of the Saorstat Government, in collaboration with well-known British aviators, have chosen July for the attempt, because in that month the head-winds that oppose any flight westward across the Atlantic are least powerful.

Negotiations are proceeding with several British aircraft firms for a suitable machine, which it is stated should be driven by three air-cooled engines. The cruising speed of the 'plane, it is calculated, will be from 85 to 90 miles an hour, and allowing for a moderate head-wind, the machine should alight at St. John's, Newfoundland, about 24 hours after departure.

The distance to be negotiated is 1,900 miles. The start will be made from Clifden, on the Galway coast, village famous in aeronautical history as the spot where Alcock and Brown, the British aviators, landed in 1919, having flown eastward from Newfoundland in 16 hours.

It is believed that Colonel C. F. Russell, who is in command of the Air Force since Major-General Sweeney's resignation last year, will be chief pilot. Colonel Russell's headquarters are established at Baldonnel, outside Dublin. He is an experienced aviator, and "graduated" at the Farnborough Aerodrome, and fought with the British Forces during the War.

Precise and definite particulars will be forthcoming concerning the actual plans in hand at an early date, and the proposed flight may be taken as an indication of the early development of the Air Force in the Free State. The acquisition of a large number of newer and more up-to-date machines is occupying the attention of the authorities at the moment.

Air Mail Notices

The Postmaster-General announces that the despatch of separate letter and parcel Air Mails from London to the British Army of the Rhine ceased on January 16, as the Air Mail, in consequence of the evacuation of the Cologne Area, now offers no advantage to the Army over the ordinary postal services. The despatch of civil letter and parcel Air Mails to Cologne (available for letters for any part of Western or Southern Germany, and for parcels for any part of Germany) is being maintained. The special Air Mail fee payable on a letter for any address in any part of Germany (including Cologne and the occupied area) is now 3*d.* per oz.

There appears to be an impression in some quarters that the Toulouse-Casablanca Air Mail Service has been suspended. This is incorrect. The despatch closed at the G.P.O., London, at 6 p.m. Route 9 in the current Air Mail Leaflet dated December, 1925, is being maintained.

Xmas Greeting from Ambala

R.A.F. Stations at home may have wondered why, this Xmas, the usual greetings from the Sergeants' Mess at Ambala India failed to materialise. The President of the Mess has asked Flight to explain the position, which was that a drawing had been prepared for the Xmas card, and the printers said it could be reproduced. When the cards arrived they were disappointing, to say the least, and were not such as the Mess would care to send out. By this time it was too late to do anything, as regards stations at home, although another card was hurriedly got out, which "did the trick" as far as India was concerned. For the benefit of home Stations we give the text of card No. 2, in which the situation was explained as follows :

A design was drawn for our Xmas Cards,
    And sent for "reproduction,"
But alas ! the printers made a mistake,
    And thought we meant "reconstruction."
And so this card we send to you,
    Is plain, or very nearly,
But without colours or crest, the wishes it conveys,
    Are tendered—very sincerely.

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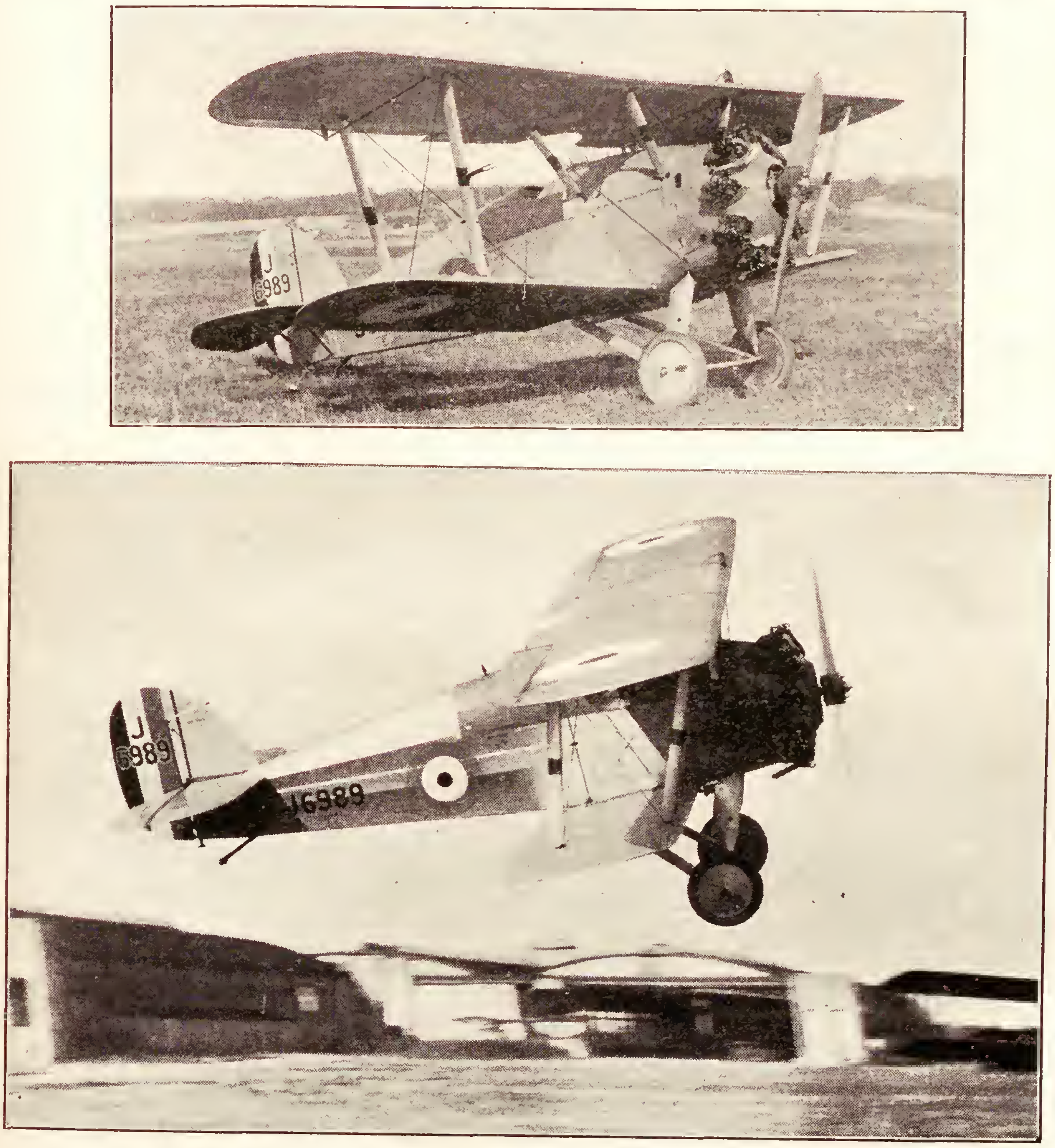

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THE SCHNEIDER CUP RACE, 1925

Major J. S. Buchanan, before reading his paper on "The Schneider Cup Race" before the Royal Aeronautical Society on January 21, 1926, pointed out that he was indebted to the Air Ministry for permission to give the paper, but at the same time he was directed to say that the views expressed therein did not in any way represent the official view of the Air Ministry, nor indicate the policy which was to be followed.

The first part of Major Buchanan's paper was devoted to a history of the Schneider Cup race, from the first one in 1913 at Monaco, to last year's race at Baltimore. As the history of the Schneider Cup race has been fairly fully dealt with in Flight, there should be no necessity to repeat it here, and it will suffice if we mention that the speeds in the race have risen from 45·4 m.p.h. in 1913 to 234 m.p.h. in 1925.

The lecturer stated that the Schneider Cup race could be viewed from two aspects: the first was the sporting and spectacular point of view, and the second the technical and scientific. He suggested that it was essential for progress in aviation to maintain these contests, but whether it was right that such races should be confined to such expensive instruments as the Schneider Cup type of machine, and at a cost which could only be borne by Governments, was a question that deserved very careful consideration. Failing Government support, the cost of this kind of racing was such that, under present conditions, no private owner could support it for any length of time. Major Buchanan pointed out that the original deed of gift of the cup provided for inter-club racing, and he doubted whether it was ever contemplated that the contest would in time become a competition between Governments. Major Buchanan suggested that *aircraft racing authorities might follow the lead given by yachtsmen, and introduce international races for small aeroplanes, in the same manner and under somewhat similar conditions to those prevailing for the international races for the* 6-*metre class yachts.* (The italics are ours.—Ed.)

The next part of Major Buchanan's paper dealt with the British Schneider Cup challengers, the Gloster II and Gloster III, and the Supermarine S.4, and gave a brief outline of the relatively small amount of testing which it was possible to carry out before the machines had to leave for America.

In the portion of Major Buchanan's paper dealing with the flying at Baltimore, the navigability and watertightness tests, etc., the statement was made that the Supermarine S.4 stalled and crashed into the sea. This, we believe, is the first time that a definite cause has been assigned to Capt. Biard's crash.

The actual account of the 1925 Schneider Cup race itself in the main contained little that has not already been published in Flight, and it is not therefore proposed, in view of the limited space at our disposal, to deal at length with this part of the paper. Tables were given showing the speeds attained by the various competitors in each of the seven laps of the course, and it will suffice if we quote from this table the highest speeds attained by the various competitors. The fastest lap covered by the winner of the race, Lieut. Doolittle, was the last one, during which the average speed of the Curtiss racer was 235·036 m.p.h. Capt. Broad's fastest lap was the third, in which his average speed was 201·536 m.p.h. Briganti's fastest lap was the third, covered at an average speed of 173·858 m.p.h. The two remaining competitors did not complete the course, but Lieut. Cuddihy's fastest lap was the fourth, in which his speed was 223·081 m.p.h. and Lieut. Offstie's fastest lap was the fourth, in which his speed was 223·041 m.p.h.

Turning to the more technical aspects of the race, Major Buchanan gave a table, which we reproduce herewith, in which he gave such information as he had been able to collect on the more important racing aircraft of recent years. He pointed out, however, that the information had been gathered from a large number of sources, and it had not always been possible to check all the details with absolute accuracy. He thought, however, they were sufficiently accurate to serve as a basis of comparison.

The lecturer called attention to the "Bamel" seaplane, which existed as an aeroplane in 1923, and he pointed out that if a pair of floats had been fitted to it, as has now been done, its speed would have been within 5 m.p.h. of the Curtiss winner. It was, therefore, fair to say that, except for wing radiators and Reed propellers, in 1923 we were as far advanced in racing types as America, and it was from 1923 onwards that we failed to keep abreast of our competitors.

Turning next to an examination of the respects in which the Curtiss racers in the last Schneider Cup race were superior to the British entries, Major Buchanan stated that the principal points of superiority were: (*a*) general cleanness of design and absence of parasitic resistance (except possibly in the case of S.4); (*b*) wing radiators; (*c*) more efficient propellers of the latest Reed type; (*d*) better trained pilots, and a settled organisation for racing.

The only point on which British designers could fairly claim superiority was in float design. Both the Gloster III and the S.4 were cleaner on the water, and had a much cleaner and a much quicker take-off than either the Curtiss or Macchi racers.

On examining these items in detail it was, the lecturer said, apparent that under (*a*) the most important item was body drag. If a good high-speed wing was chosen, improvements in wing form could only give increases of speed of a minor order. In connection with body drag, the lecturer referred to an analysis made by Mr. Glauert and Mr. McKinnon Wood, of the Curtiss aeroplane racers of 1923, in which it appeared that the body drag of this aeroplane should be from 2½ to 3 lbs./sq. ft. of frontal area at 100 ft. per second. If this drag could be reduced to 1½ lbs./sq. ft., it was estimated that a gain of 8 per cent. in speed would result. The resistance of a good streamline shape at 100 ft. per second was 1·2 to 1·3 lbs./sq. ft.; but it was unlikely that this figure could be achieved on an aeroplane, because of the cockpit opening and minor obstructions. Model tests at the N.P.L. indicated that the cockpit opening with windscreen and pilot's head would increase this resistance to 1·7 lbs./sq. ft. It was possible, therefore, the lecturer said, that as much was to be gained by a carefully faired and streamlined body as by an actual reduction in the cross-sectional area. Obviously it would be better to reduce the drag by both methods, but the reduction in cross-sectional area of the body was limited by the size of the pilot and the space necessary for instruments, etc.

Under heading (*b*) Major Buchanan stated that the Curtiss Company claimed that the introduction of wing radiators improved the speed of their aeroplanes by 20 m.p.h. at speeds

TABLE

Characteristics of Racing Seaplanes

	Sea Lion.	Bamel.	Gloster II.	Gloster III	S. 4.	Curtiss 1923.	Curtiss 1924.	Curtiss 1925.
Total Weight (lbs.)	3,230	2,770	2,500	2,687	3,191	2,747	2,640	2,710
Wing Area (sq. ft.)..	285	200	150	152	136 (flaps.)	148	162	144
Wing Loading (lbs./sq. ft.) ..	11·3	13·8	16·6	17·7	23·5	18·5	16·3	18·8
H.P. Loading (lbs./h.p.)	5·6	4·8	3·95	3·8	4·6	6·0	5·3	4·4
Area of Fuselage—								
Max. Cross Section (sq. ft.) ..	11·5	—	9·1	9·1	8·1	7	7	6·5*
Prop. Diar.	8ft. 8ins.	9ft. 6ins.	9ft. 10ins.	7ft. 9ins.	8ft. 0ins.	8ft. 6ins.	—	7ft. 8ins.
Prop. Pitch	10ft. 6ins.	12ft. 10ins.	15ft. 11ins.	8ft. 11ins.	9ft. 3ins.	9ft. 4ins.	—	10ft. 0ins.
Engine Weight (lbs.)	920	920	840	730	730	690	690	660
Engine horse-power	575	575	633	700	700	460	500	619
Engine r.p.m.	2,300	2,300	2,500	2,700	2,700	2,300	2,300	2,350
Speed on Straight (m.p.h.) ..	155	189	210 (estimated)	218	237	194	227	246
Landing Speed (m.p.h.)	63·5	75	79	80	90	85	80	85

* Wing radiators, 174 sq. ft.

in the neighbourhood of 250 m.p.h. It, therefore, seemed essential that future racing aeroplanes should be fitted with surface radiators.

Under heading (*c*) Major Buchanan said that the limited time available did not permit of carrying out propeller tests on the British machines before they went to America. The forged type of Reed propeller, as used by the Americans, was reported to give better results than the best sheet type, and it was claimed that an improvement of 3 per cent. in efficiency was obtained. The interesting statement was made by Major Buchanan that the propeller efficiency of the seaplanes of 1925 was about 80 to 85 per cent. at full speed, and probably as low as 8 per cent. at take-off speed.

Turning to (*d*), the question of training of pilots, the lecturer stated that the American pilots were experienced in racing, and all of them were fully trained, whereas, apart from a few flights before leaving this country, none of our pilots had any experience of flying or cornering at 200 m.p.h.

Finally, Major Buchanan expressed the opinion that little was to be gained by reduced engine weight or reduced structure weight. The engines were approaching 1 lb. per h.p., and even if it were possible to reduce this to ½ lb. per h.p., the gain in speed would not be more than, say, 2 per cent.

In conclusion Major Buchanan summed up the problems we have to solve in order to increase our speed in the next race as follows: (1) the body drag must be reduced, both by reducing size and increasing efficiency; (2) wing surface radiators must be used; (3) the best type of propeller must be fitted, and to ensure success in this direction the aircraft must be carefully tested-out before entering for the race; (4) highly-trained pilots must be available to fly the aeroplanes.

The Discussion

Sir Sefton Brancker, who was in the chair, then called upon Mr. H. P. Folland to open the discussion. Mr. Folland pointed out that he was naturally very much interested in the paper, since he had been connected in some small way with the Schneider Cup Race of 1925. He pointed out that whereas the Americans had had a great deal of experience in air racing of various sorts, we in this country had had very little experience of air racing at really high speeds. Concerning the "Bamel," to which the lecturer had referred, this machine, he said, was not really ever designed as a racer, but was the rear portion of the fuselage of the "Nighthawk," into the front portion of which a Napier "Lion" had been fitted, and the design as a whole had never been contemplated in its entirety. If we were to have any chance of equalling the speeds of the Americans it would be necessary for pilots to be taken over six months before the race for training purposes, and that being so it might be found that it was preferable to employ service pilots for this kind of racing. The question of engine was an all-important one, and it seemed a pity if something could not be done to give British aircraft designers an engine of smaller drag. On the subject of propellers, he thought we ought to carry out experiments on metal propellers, since their experience was that in the Schneider Cup machines the propellers used had a tendency to straighten out owing to movements of the centre of pressure. He agreed with the lecturer on the question of higher load factors being required, and thought that these should be somewhere about 8 or 9. As our pilots got used to the fast machines they would be able to "throw them about" more, which might mean that loads up to, say, 5g. would be imposed upon the machines.

Mr. R. J. Mitchell said he was interested in the lecturer's suggestions for improvements. He agreed with the lecturer that body drag was an important item, but thought it probable that interference between body and wing, or body and undercarriage, might be equally important, and that bad attachments of these members to the fuselage might easily double the resistance. Concerning the lecturer's statement that a reduction in engine weight of from 1 lb. per h.p. to ½ lb. per h.p. would only give an increase of about 2 per cent. in speed, he thought this was a dangerous remark, since there were engine people present. His own estimate would be rather higher, say, about 2½ per cent. The fact was that a reduction in weight led to other reductions. As the lecturer had pointed out, the maximum cross-sectional area of the Supermarine S.4 was 8 sq. ft. This could have been reduced but for the cantilever wings and undercarriage. The lecturer had pointed out the roads to improvement, and if the experience gained in the last Schneider Cup Race was taken advantage of, he viewed the future with optimism. Moreover, he still thought the Napier racing engine capable of winning the Cup.

Capt. Biard said he agreed with the lecturer in the matter of training of pilots. The British pilots had only had 1½ hours at full speed on the machine previous to the race, and he thought we should have lost the race on that score only, apart from the relative performances of the machines. He had been interested in the lecturer's statement that high-speed dives were not necessary, and promised to take this to heart—a statement which caused a great deal of amusement.

Squadron-Leader Rollo Haig wanted to know whether the winner used a doped fuel, and, if so, how was it composed? He would also like to know whether the American machines were equipped with parachutes and, if so, whether the pilots could have used them had they been needed.

Commander J. Hunsaker thought these races were very useful for technical men. On the question of engines, the reduction of area was a matter for the engine designers, and he thought the lecturer was not quite right in his remarks about engine weight. The thing to do was not to reduce the engine weight below what it was now, but to keep the engine weight the same and double the power output of it. If this were done there would be a very immediate gain in speed, and this was what the Curtiss Company had done. Concerning last year's race, it was an unfortunate fact that comfort for the spectators meant discomfort for the pilots. At the next Schneider Cup Race the public would, he thought, be given less consideration and the crews more. As regards the future, Commander Hunsaker said that as engine power increased, so speed would go up. Improved load factors would meet this, but he was not so sure about the load factors of the pilots, and it did seem unwise to go on with a race which in time would tend to become a test of pilots rather than of machines. Perhaps it was time a different course was chosen, say, a hexagonal one instead of a triangular one, since this would reduce the angle of turns that had to be made, and so machines could be more on a steady curve the whole way round the course.

Mr. M. L. Bramson said there was a difficulty in establishing a criterion for engines, and suggested as a possible formula, horse-power divided by weight, and divided by frontal area, as a sort of "efficiency figure" for engines. He would like to know whether, in attaching the wings to the fuselage, it was better to attach them at the bottom, in the middle, or at the top, or whether the parasol arrangement was likely to be better, giving an ideal fuselage and an ideal wing. There was also the question of the effect of the spiral slip-stream on the portion of the wing which should be the most useful. Concerning cornering, he would like to know which of three methods would be likely to be the best, either corner sharply but slow down for the turn, keep at top speed but take the corners wide, or maintain full power but climb at the turn so as to convert dynamic into kinetic energy, which could be made use of on the straight on the way to the next corner.

Flight-Lieut. Bulman thought the British pilots did extremely well with their limited experience. He said he had personally had very little experience of racing on really fast machines, but from his experience as a test pilot he thought that when a pilot first took out a new type his first troubles were mainly machine troubles. For the first hour or so the behaviour of the machine occupied his mind to the exclusion of almost everything else. After that, he began to pay attention to the technique of flying the machine. At full speed the question of the directional properties of the machine became very important. He did not think there could be any doubt that to fly the best race it was necessary to cut the corners fine, and to fly as low as possible, and it was then extremely important that the machine should have good directional and lateral controls. One of the most important things which made for success was to make the pilot feel comfortable. He would like to know something about directional control in racers, and he had personally found a difficulty in preventing fast machines from climbing.

Mr. F. Handley Page wanted to know if the lecturer could give the analysis by McKinnon Wood referred to in the paper, as this would be very interesting. He suggested that possibly the analysis could be printed as an addendum to the paper.

Colonel Bristow thought the Royal Aero Club had not produced as much progress by handicap races as by scratch races, and thought it a pity that we could not have more pure speed racing. On the question of pilots, to send the British pilots over for the Schneider Race with the little experience they had had was about equivalent to giving a racing driver an hour or so on Brooklands track and then, with no further training, expect him to take part in the Grand Prix. Colonel Bristow humorously referred to the testing of models of racers in wind-tunnels, and said that perhaps some day it would not be necessary to hold the Schneider Cup Race at all. What would be done would be to have models of the various challengers and defenders tested in the wind-tunnels, and have the results sent to Locarno, where they

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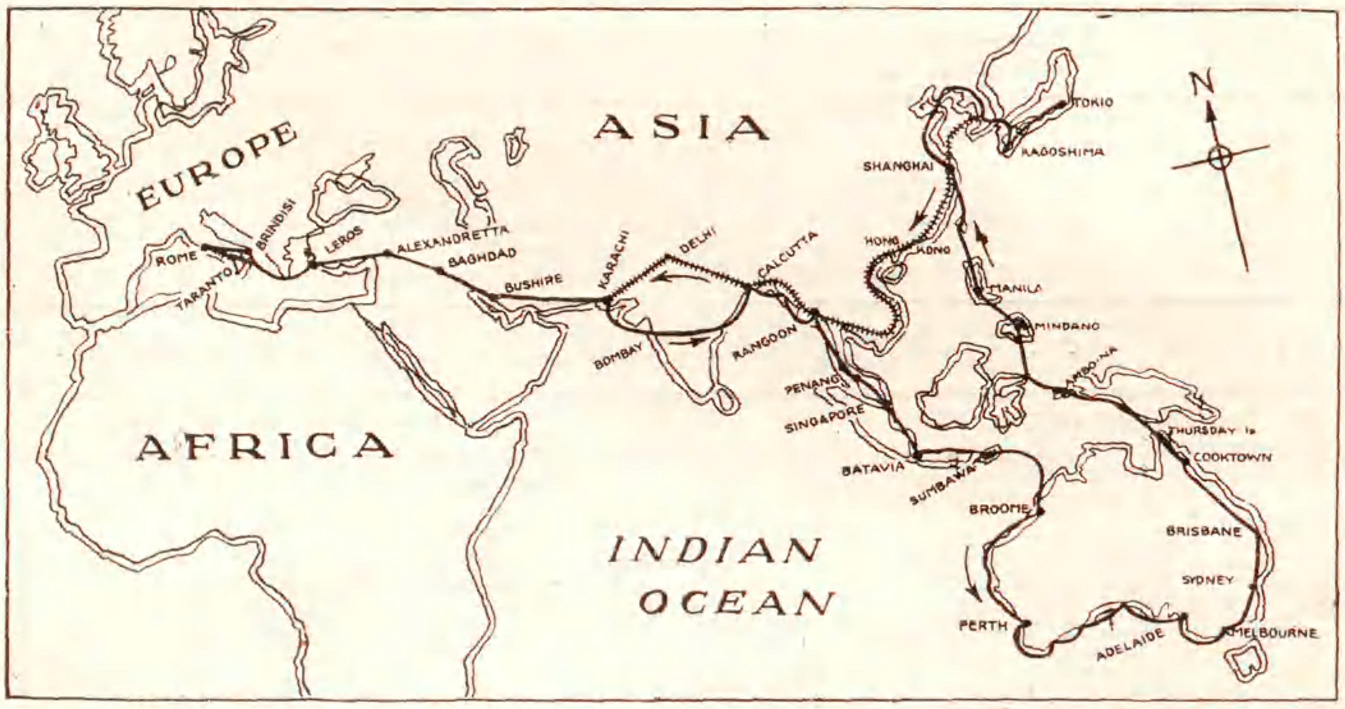

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would then be judged by all the Prime Ministers of Europe. In conclusion, he said he would like to point out that after all Great Britain very nearly won the Schneider Cup Race, since 66 per cent. of the Curtiss engines broke down, and it seemed quite possible that had the race lasted a bit longer the remaining 33 per cent. would have broken down also, and left Great Britain the winner!

Major Buchanan, in replying to the various queries raised in the discussion, said that the fuel used by the Americans was a mixture consisting of 50 per cent. petrol and 50 per cent. benzole. He agreed with Commander Hunsaker that the best line of development was to keep the present engine-weight the same, but to try to double the power output. Concerning the effect on pilots of cornering, he thought the experience of Lieut. Doolittle in some test flights with an accelerometer was that it was discovered that he could stand 4g. for fairly long periods, and as much as 8 g. for very short periods. On the question of the stabliity of the racers, he thought Captain Broad was troubled throughout the race by a certain amount of directional instability. Curiously enough, it seemed that the experience of all the Schneider Cup pilots was that the worst effect of acceleration was felt during the take-off. He thought undoubtedly the American machines had better directional stability. He did not think Mr. Bramson's suggestion of letting the machine climb at the turns and then, after straightening out, diving for the next turning point, would result in a good course being flown. Actually, he thought, Lieut. Doolittle, did climb slightly, but only about 50 feet or so on turns, and he thought this climb was probably accidental rather than intentional.

Sir Sefton Brancker said he was a keen supporter of racing and he referred to the good effect which such air races as the Schneider Cup had internationally. He expressed his gratitude to the three firms who had taken part in last year's Schneider Cup Race and then, turning to the question of organisation, said this was important, and last year's British organization was lacking in funds. It was difficult to find a patron for the expenses incurred in training civilian pilots for races, and that being so, perhaps it would be better to turn to the Services for racing pilots. Concerning Commander Hunsaker's remarks relating to studying the public and giving them a chance to watch the race, he thought that although this might be the correct attitude for ordinary races it was not so in the case of championships such as the Schneider Cup Race, and it might be necessary to neglect the public in order to give the competitors a fair chance. Although he was not speaking officially, he thought he could say that if the Schneider Cup Race was put off until 1927, the Air Ministry would "see it through" as regards British challengers.

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THE GOVERNOR-GENERAL OF AUSTRALIA TO FLY

As briefly mentioned last week, the recently-appointed Governor-General of Australia, Lord Stonehaven, is a keen and practical supporter of aviation, who realises keenly the part which the aeroplane can play in the development of the Commonwealth. It is not surprising, therefore, to learn that Lord Stonehaven—who, during the War as Major J. L. Baird, C.M.G., D.S.O., M.P., was Under-Secretary of State for Air—intends to use an aeroplane for official visits throughout Australia.

The machine which will be used is now approaching completion at the De Havilland Aircraft Company's Works at Edgware. It is a D.H. 50 biplane, fitted with a 230 h.p. Siddeley "Puma" engine, and is similar to that which Alan Cobham used for the flight from London to Rangoon and back last year and for the journey to Cape Town, upon which he is now engaged.

There is a cabin with seats for four passengers, so that an A.D.C. and a private secretary will be able to accompany the Governor on his journeys, as they would by any other means of transport.

A feature of the aeroplane (which has been ordered by the Australian Air Board) is its interchangeable undercarriage, it being but the work of an hour or so to convert it from a landplane with wheels to a seaplane with floats, so that, should a coastal journey be contemplated, the machine would fly as a seaplane, while for overland trips it will be used as an ordinary aeroplane.

A striking demonstration of the value of air transport in Australia was afforded by Col. Brinsmead's recent flight across Australia from north to south, which, as described in last week's Flight, was carried out on a D.H.50 aeroplane in two days—a journey of 1,600 miles which, by any other mode of transport, would occupy three or four weeks, and it is expected that by using the aeroplane Lord Stonehaven will be able to visit outlying parts of Australia which hitherto have been out of reach owing to lack of communications.

◆ ◆ ◆ ◆

A British Schneider Cup Team?

We understand that, after all, Great Britain will be represented by a full team at the next Schneider Cup contest, for Mr. S. E. Saunders, of Cowes, has sportingly come forward with the offer to enter a team of three or four challengers.

Paris—Teheran and Back

Three of the four French military airmen—Capt. Girier, and Lieuts. Challé and Rabatel—who set out from Villacoublay to fly to Teheran and back, returned safely to Lyons on January 18, having covered over 8,000 miles in about 80 hours' flying time. Lieuts. Challé and Rabatel concluded the flight on January 21, when they arrived back in Villacoublay, but Capt. Girier was held up at Dijon, while the fourth pilot, Capt. Dagnaux, is at Aleppo on a special mission. The machines used were a Potez XV (450 Lorraine-Dietrich) and three Breguet XIX biplanes fitted respectively with 400 Renault, 500 Farman and 500 Hispano-Suiza engines.

The R.A.F. Pocket Diary

We have just received a copy of the R.A.F. Pocket Diary, published by permission of the Air Ministry by Gale and Polden, Ltd., of Wellington Works, Aldershot. At the outset we must say that this little diary is excellent in every way—it is, in fact, one of the best of its kind, that is, a diary produced for the use of those interested in some special subject, that we have seen for some time. In addition to the usual desiderata common to diarys it contains a host of information relating to aviation. Perhaps we cannot do better than just give a list of the items given in its pages, viz.: Notes on the R.A.F. Memorial Fund (10 per cent. of the published price of every copy sold being handed over to this Fund), and the Salting Benefaction Grants; The Royal Air Force Tradition; Theatres of War in which the R.A.F. has operated from 1884 to date; Awarded the Victoria Cross (R.A.F.); Principal Events in the History of Service Aeronautics; Squadrons and dates of formation; Auxiliary A.F. Squadrons; Aircraft Carriers; Notable British Flights since the Great War; R.A.F. Display; British Air Mail and Passenger Services; Light Aeroplane Clubs; Aerial Derby, Gordon Bennett Balloon Race, Schneider Cup, and King's Cup Winners; Mortimer Singer Competition; Britannia Challenge Trophy; R.A.F. (Cadet) College; Aerial Societies and Clubs; Services Clubs and Institutes; Useful Formulæ Efficiences; English-Metric tables; Constitution of R.A.F. Sports Board and Addresses of Hon. Secs. of R.A.F. Sports Associations; List of Home Commands, Depots, Stations, etc.; Stations Abroad; and several pages devoted to R.A.F. and Service Sports. Thus, it will be seen, that it is well worth the 2*s*. (R.A.F. blue cloth) or 3*s*. (royal blue leather) at which it is published.

London Air Defence; Vacancies for Subalterns

The War Office announces that the anti-aircraft defences of London, which have been entrusted to the Territorial Army, are being steadily developed in both numbers and efficiency. There are, however, still a few vacancies for subalterns in the 26th Air Defence Brigade, and the officer commanding the brigade, Duke of York's Headquarters, Chelsea, will be glad to hear from prospective candidates and to communicate to them such information as they may desire. The 26th Brigade comprises Royal Artillery and Royal Engineer units, whose duty, in the event of an attack, would be to engage enemy aircraft with gun-fire, aided by searchlights, and to deal with any that might break through the outer defences. Training makes only a small demand on an officer's spare time.

SECURITY IN THE AIR

The Air League Warns the Country Against Dangers of Economy

AT a luncheon given by the Air League of the British Empire at the Savoy Hotel, on January 22, a distinguished gathering discussed the serious effect which the economies, said to be contemplated for this year's Air Estimates, was likely to have on the question of national security against air attack, and it was pointed out that it was essential that the nation, the man in the street, should be made to realise the position and not be living under a false impression of security.

In the unavoidable absence of the President of the League, His Grace the Duke of Sutherland, the chair was taken by Mr. Philip S. Foster, Chairman of the Executive Committee of the League. After the loyal toast, Mr. Foster sketched a brief outline of the post-war history of aviation in Great Britain, pointing out the reduction which had taken place in the number of firms of which the British aircraft industry is composed, and which, at the end of the war, counted something like 150 firms, employing many hundreds of designers and thousands of skilled craftsmen, but which had now dwindled to a numerically small industry, although he was glad to say an industry sufficiently prosperous, and very efficient. He pointed out, however, that it would need but very little, such as a sudden shortening of orders, to place this industry in the condition of one struggling against adversity.

Information had recently reached the Committee of the Air League of the British Empire that there was a suggestion on foot that the completion of the Air Defence scheme for 52 squadrons might be reconsidered, and might even be reduced, on account of the need for economy. The rumour sounded like fantastic romance, but had come to them on good authority, and they, therefore, felt that immediate and drastic action must be taken. Such a policy was against the considered opinion of every single Government since the war. Mr. Foster then quoted examples from a number of speeches by responsible ministers in which it was laid down time after time, and had come to be accepted as an irreducible minimum, that British air power must include a home defence of sufficient strength adequately to protect us against air attack by the strongest air force within striking distance of this country.

They had been given to understand that as the result of the deliberations of the Colwyn Committee very considerable cuts would be made in the Air Estimates. It was further understood that such cuts might fall on the Vote for Technical and War-like Stores. This in turn would be reflected on the aircraft industry, which was still in such a position that the country could not possibly afford any further weakening of that industry. The air should be, and he felt in the future it must be our first line of defence, and yet we spent far less money on it than on the two senior services. Any further cutting down in the Air Force would render it still more inadequate, and we might almost as well be without it altogether. Mr. Foster then quoted a passage from the Geddes Committee Report on Economies of 1922.

Continuing, Mr. Foster said that, as the Air Force depended on the aircraft trade for its equipment, they had invited the Society of British Aircraft Constructors to state their views on the matter, and they had selected Mr. Fairey as their spokesman. He now had much pleasure in calling upon Mr. Fairey to address the assembly.

Mr. C. R. Fairey, Chairman of the Fairey Aviation Co., Ltd., and past Chairman of the Society of British Aircraft Constructors, said that a man in his position, in making a speech on the question of air defence at once laid himself open to attack on the score that he was an interested party, but that was a risk which was inevitable and which had to be accepted.

In a very closely reasoned, concise and dignified speech, Mr. Fairey outlined the position, and uttered a word of warning as to the consequences of interfering with an industry which had attained its present balance mainly on the promise that the policy hitherto followed would be pursued for several years to come. Mr. Fairey pointed out that the British aircraft industry was a very essential part of the whole Air Force scheme, and called attention to a fact which is sometimes apt to be overlooked, that aircraft were consumable munitions of war and that losses of 50 per cent. per month from the outbreak of hostilities of machines in the fighting line would not be an unfair estimate. This meant that in two months the Air Force would be immobilised on the ground unless the aircraft industry could provide the required number of new machines within that time.

Concerning reserves, it was understood that our present reserve was only about 100 per cent. In France there were approximately 4,000 machines in reserve, as against 1,500 machines in the first line, and he thought the reserves should be at least 300 per cent. of first-line machines, since, with the wastages to be expected on the outbreak of hostilities, anything less than about 300 per cent. of machines in reserve would mean the Air Force running short of flying stock before the aircraft industry could expand to the extent necessary to supply the needs of the Air Force. The time taken to do this Mr. Fairey put at about five months.

These estimates were based upon the aircraft industry as it existed today. If the information which had reached the Air League was correct, it was, he understood, proposed to reduce the amount of money available for the industry. The industry had dwindled down to something like twenty firms all told, out of which but four were aero-engine firms. Any interference with the programme hitherto followed, and any reduction of orders, would inevitably mean that some at least of these twenty firms would be compelled to close down. A result of this would be that an industry which under present conditions might be said to consist of firms which had survived and had now settled down to very keen technical, and to some extent financial, competition, under which it was just able to exist, would not be in a position to supply the R.A.F. in case of emergency with the machines required. It would appear that any cut would not only mean the loss of design staffs and skilled workmen, but it seemed to be useless to proceed with expansion of the Air Force without reserves of machines to give the industry time to get going. What was required was that the aircraft industry should be taken out of the realm of shifting policy, and in this connection Mr. Fairey pointed out that at the present moment the aircraft industry had little to offer to intelligent young engineers to take up an aeronautical career. In the last war there was a struggle of design as well as output, and where, he asked, were the designers of the future to come from unless there was a staple industry to offer them a career? What would make matters worse was the fact that, whereas in the last war it was possible with the comparatively primitive timber-built machines then in use, to make them in furniture factories, the modern aeroplane was such a highly specialised piece of apparatus that it could only be constructed in properly equipped factories.

Returning to the subject of the outbreak of war, Mr. Fairey called attention to the fact that no matter how strong the industry or how large the reserves, the standing Air Force must be capable of withstanding the first onslaught, which would be directed against Government buildings, munitions factories, railway and road centres, and so forth, and unless the standing Air Force was strong enough to withstand the first attack of an enemy there was little need to worry about the future, since in that case there would be no time or possibility for getting the aircraft works going on the larger scale required by war conditions.

Whichever way one looked at the subject, whether in the Locarno spirit or in any other spirit, it had always been axiomatic that Great Britain must rely upon her own strong right arm, and not upon the goodwill of her neighbours for protection. If this country had once established itself as the first Air Power in the world, it would be able to speak with authority and to be listened to on the subject of aerial disarmament. British air power had never been intended for other than defensive purposes, and there had never been any suggestion that it would ever constitute a danger to other nations by being used for offensive purposes. If economies were necessary he thought the other services should come first. They were told that they would starve in three months if the Navy could not hold open the sea routes, but if they lost the first advantage in an aerial attack, the war would not last three months. Having once attained a position as the first Air Power they would be able to get that aerial disarmament which would enable them to turn their resources to the development of air power for the purpose of peace.

Commander Kenworthy, M.P., in passing a vote of thanks to the Chairman and to Mr. Fairey, said that if economies were essential there were savings to be made with less risk in other services. The time had come when there should be one spending department for the three services acting under a Ministry of Defence, as that was the only way in which they could ensure proper allocation of the funds available for defence.

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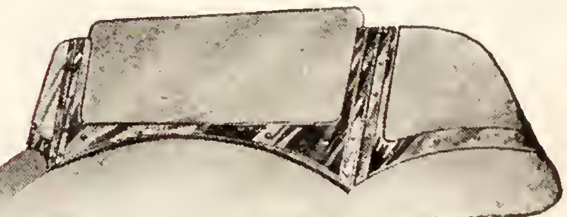

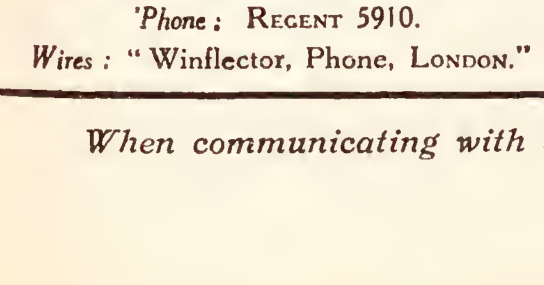

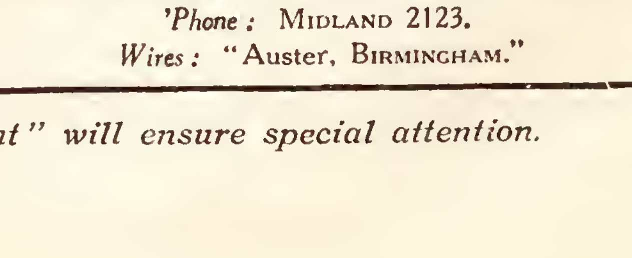

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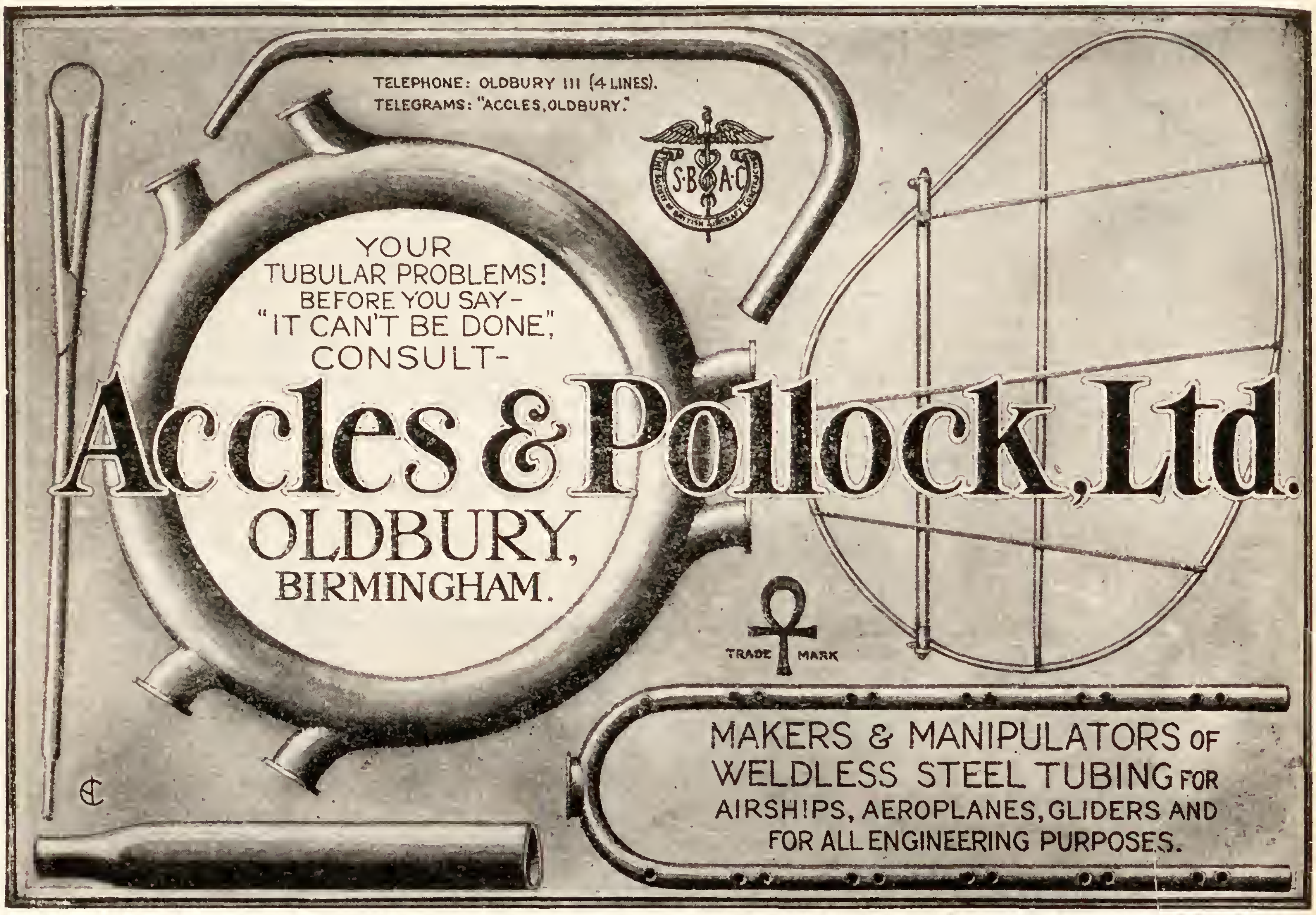

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THE ROYAL AIR FORCE

London Gazette, January 19, 1926

General Duties Branch

The following are granted perm. commns. in the ranks stated (Jan. 1)—*Flight Lieuts.*—H. C. Irwin, A.F.C., A. D. Rogers, A.F.C., W. E. Swann, G. O. Venn. *Flying Officers.*—E. F. Haylock, G. H. Vasse.

A. P. K. Hattersley is granted a short service commn. as a Flying Offr. on probation, with effect from and with seny. of Jan. 11. Flying Offr. S. T. Kemp is placed on retired list; Jan. 17. Flying Offr. E. J. Rossiter is placed on retired list on account of ill-health; Jan. 20.

The following are transferred to the Reserve:—

Class A.—Flight Lieuts.—N. H. Jay; Jan. 18. W. N. Cumming, D.F.C.; Jan. 21. *Flying Offrs.*—G. S. Brown, D. H. Geeson, J. de la P. B. Preston; Jan. 15. M. K. McGregor, R. V. D. White; Jan. 18.

Class C.—Flying Offr. S. T. Tipper; Jan. 17.

The short service commn. of Pilot Offr. on probation A. C. Foreman is terminated on cessation of duty; Jan. 20. Flying Offr. H. P. F. Fagan (Lieut., Som. L.I.) relinquishes his temp. commn. on return to the Army; Jan. 12.

Medical Branch

J. Magner, M.B., is granted a short service commn. as a Flying Offr. for three years on the active list, with effect from and with seny. of Jan. 6, 1926.

Reserve of Air Force Officers

E. P. Lash is granted a commn. in Class A.A., General Duties Branch, as a Pilot Offr. on probation; Jan. 4. Flying Offr. W. E. Taylor resigns his commn.; Nov. 12, 1925.

London Gazette, January 22, 1926.

General Duties Branch

Air Commodore L. F. Blandy, C.B., D.S.O. (Colonel, Army), is seconded for a further period of service with the R.A.F.; Nov. 30, 1925. Wing Commander G. P. Grenfell, D.S.O., is appointed Deputy Director of Research (Instruments), Air Ministry, *vice* Wing Commander James Bevan Bowen, O.B.E.; Jan. 11. Flying Officer R. A. P. Roberts is restored to full-pay from half-pay; Jan. 6.

Erratum.—*Gazette* of Dec. 15, 1925 (Flight, Dec. 24, 1925, p. 845):—*For* R. E. Costa *read* R. Costa.

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified:—

General Duties Branch

Group Captain: A. G. Board, C.M.G., D.S.O., to R.A.F. Depot, on transfer to Home Estabt.; 1.1.26.

Wing Commanders: O. T. Boyd, O.B.E., M.C., A.F.C., to R.A.F. Depot, while attending course at Army Staff Coll., Camberley; 21.1.26. A. ap Ellis, C.B.E., to H.Q. Air Defences of Great Britain, for Personnel Staff duties, on transfer to Home Estabt.; 1.1.26.

Squadron Leaders: A. R. C. Cooper, to R.A.F. Depot, on transfer to Home Estabt.; 9.1.26. A. D. Pryor, to No. 5 Flying Training Sch., Sealand; 14.1.26. G. F. Broose, D.S.C., to R.A.F. Depot, on transfer to Home Estabt.; 8.1.26. R. T. Leather, A.F.C., to R.A.F. Depot, on transfer to Home Estabt.; 24.12.25. G. S. Trewin, A.F.C., to R.A.F. Depot, on transfer to Home Estabt.; 12.12.25. K. C. Buss, to R.A.F. Depot on transfer to Home Estabt.; 27.11.25.

Flight Lieuts.: A. R. Mackenzie, to Station H.Q., Andover, on transfer to Home Estabt.; 21.1.26. R. C. Bryant, to Heliopolis Details, Egypt; 21.12.25. W. E. G. Bryant, M.B.E., to No. 2 Sqdn., Manston; 4.11.25. W. E. Somervell, A.F.C., to No. 2 Sqdn., Manston; 14.12.25. A. G. Jones-Williams, M.C., F. L. Luxmoore, D.F.C., and R. V. Bramwell-Davis, to R.A.F. Depot, on transfer to Home Estabt.; 12.12.25. F. Fernihough, M.C., M. Keegan, O.B.E., M.M., P. E. Gwyer, M.B.E., A. S. Thompson, H.V. Rowley, S. L. Quino, M.C., G. Y. Tyrrell, M.C., R. D. Starley, M.C., and G. Archer, to R.A.F. Depot, on transfer to Home Estabt.; 31.12.25. R. J. M. De St. Leger and T. Humble, to R.A.F. Depot, on transfer to Home Estabt.; 21.12.25.

Flying Officers: G. S. Taylor, to Heliopolis Details, Egypt; 12.12.25. W. F. Warner, to R.A.F. Depot, on transfer to Home Estabt.; 20.12.25. W. F. Warner, to No. 9 Sqdn., Manston; 1.2.26. J. N. Jaques, to R.A.F. Depot, on transfer to Home Estabt.; 9.1.26. H. W. R. Banting, to No. 58 Sqdn., Worthy Down, on transfer to Home Estabt.; 23.1.26. J. S. Wilkins, to R.A.F. Depot; 22.1.26. A. Page, to Record Office, Ruislip; 15.1.26. G. V. Wheatley, to No. 22 Sqdn., Martlesham Heath; 15.2.26. C. W. S. Chalmers, to R.A.F. Depot; 21.1.26. C. C. Musselwhite, to remain at No. 5 Sqdn., India, instead of to R.A.F. Depot, as previously notified. G. W. Higgs, to No. 19 Sqdn., Duxford; 28.1.26. (Hon. Flight-Lieut.) P. I. V. Rippon, to R.A.F. Base, Calshot; 19.1.26. A. W. Crees, to remain at No. 4. Armoured Car Co., Iraq., instead of to R.A.F. Depot, as previously notified. J. H. Hargroves, F. S. Wainscot, J. Bradbury, C. B. McIntyre, E. C. N. Jeffries, R. A. R. Mangles, M. C. W. C. Flint, M.C., and B. R. C. Coope, to R.A.F. Depot, on transfer to Home Estabt.; 21.12.25. A. M. Reidy, L. E. Dowse, I. M. Morris, H. R. McL. Reid, D.F.C., and T. B. Bruce, M.C., to R.A.F. Depot, on transfer to Home Estabt.; 31.12.25. F. H. H. Twelvetree, to R.A.F. Depot, on transfer to Home Estabt.; 4.1.26. R. F. De R. Read, to R.A.F. Depot, on transfer to Home Estabt.; 21.12.25, H. J. Soper, to Marine Aircraft Experimental Estabt., Felixstowe, on transfer to Home Estabt.; 12.12.25. C. C. Clark, to Mechan. Transport Repair Depot, Shrewsbury, on transfer to Home Estabt.; 12.12.25. G. H. Vasse and S. A. Lane, to R.A.F. Depot, on transfer to Home Estabt.; 12.12.25. H. A. Bayne, to No. 25 Sqdn., Hawkinge, on transfer to Home Estabt.; 12.12.25. J. B. Barrett, to R.A.F. Depot, on transfer to Home Estabt.; 12.12.25.

Pilot Officers: J. G. D. Armour, to No. 111 Sqdn., Duxford; 31.1.26. The undermentioned Pilot Officers are all posted to No. 4 Flying Training School, Egypt, with effect 15.1.26:—N. J. Anderson, G. M. Beattie, J. E. A. Binnie T. J. L. Bradley, L. S. T. Brown, N. R. Buckle, W. B. Causer, G. R. T. Clarke, M. A. Cowan, P. H. Danger, A. P. de Woulf De Wytt, C. E. Eckersley-Maslin, C. L. Edwards, G. H. Godwin, W. E. W. Grieve, H. R. Hawker, J. E. McC. Henderson, D. J. R. Hylton, H. E. Milton, P. A. Moritz, A. W. H. Nelson E. G. Oslon, J. H. Pool, A. A. Radclyffe, H. T. A. Silcox, L. M. Timmins, L. S. Tindall, C. Warsow, C. D. G. Welch and F. H. Bailey.

Stores Branch

Squadron Leader: T. G. Skeats, to R.A.F. Depot, on transfer to Home Estabt.; 31.12.25.

Flight Lieuts.: K. D. G. Collier and L. H. Vernon, to R.A.F Depot, on transfer to Home Estabt.; 31.12.25. E. W. Crosbie, to R.A.F Depot, on transfer to Home Estabt.; 12.12.25..

Flying Officers: W. A. Kyte, to No. 3 Sqdn., Upavon; 13.1.26. W. B. Frederick to Central Flying Sch.—Upavon; 13.1.26. E. V. E. Andrewartha, to R.A.F. Depot, on transfer to Home Estabt.; 21.12.25. C. A. Longhurst, to R.A.F. Depot, on transfer to Home Estabt.; 31.12.25.

Pilot Officer: C. P. Marshall, to No. 41 Sqdn.—Northolt; 13.1.26.

Accountant Branch

Flight Lieut.: J. C. Brice, to No. 2 Flying Training Sch., Digby; 25.1.26.

Flying Officers: J. Freeman-Fowler, W. A. Wadley, and C. G. Prior to R. A. F. Depot, on transfer to Home Estabt.; 12.12.25

Medical Branch

Sqdn. Leaders: A. J. O. Wigmore, M.B., to R.A.F. British Hospital, Iraq; 13.12.25. P. T. Rutherford, O.B.E., to Station Commandant, Hinaidi; 13.12.25. G. S. Marshall, O.B.E., D.P.H., D.T.M. & H., to Air Ministry; 15.1.26. J. M. A. Costello, M.C., M.D., M.Sc., to R.A.F. Depot, on transfer to Home Estabt.; 12.12.25.

Flight Lieuts.: J. R. Crolius, M.B., to R.A.F. Depot, on transfer to Home Estabt.; 20.12.25. J. C. Osburne, M.B., to Specialists' Medical Estab. 13.1.26. J. A. Musgrave, D.P.H., to R.A.F. Depot, on transfer to Home Estabt.; 31.12.25. G. R. Nodwell, M.B., and F K. Wilson, M.B., to R.A.F. Depot, on transfer to Home Estabt.; 12.12.25. C. T. Hastings (Dental), to R.A.F. Depot, on transfer to Home Estabt.; 31.12.25.

Flying Officers: G. J. Hanly, M.B., to No. 27 Sqdn., India; 18.12.25. B. W. Cross, to No. 28 Sqdn., India; 18.12.25. J. McC. Kilpatrick, M.B., to No. 60 Sqdn., India; 18.12.25. C. G. J. Nicolls, M.B., to Aircraft Park, India; 18.12.25. R. F. G. Dickson, to Aircraft Depot, India; 18.12.25. C. J. S. O'Malley, to Research Lab. and Med. Officers' Sch. of Instruction, Hampstead, for short course; 14.1.26. R. L. C. Fisher, M.B. and S. S. Proctor, M.B., to R.A.F. Depot, on transfer to Home Estabt.; 12.12.25.

Flying Officers (Q.Mastr. Medical): W. Gamblen and W. King, to R.A.F. Depot, on transfer to Home Estabt.; 12.12.25. W. King, to R.A.F. Hospital, Cranwell; 22.1.26.

NAVAL APPOINTMENTS

The following appointments were made by the Admiralty on January 19:—

Royal Marines

Lieuts., R.M. (Flying Officers, R.A.F.): T. L. G. Bryan, to Egmont, and for 440 Flight, supy., pending posting to 441 Flight; and O. C. Jones, to Egmont and for 402 Flight, supy., pending posting to 403 Flight; Jan. 9.

Personals

Married

George W. F. Darvill, D.F.C., son of Mr. G. Darvill, formerly of East Meon, was married on January 16, at Ashtead, to Violet Ruth, youngest daughter of Mr. and Mrs. Charles D. Collins, of Ashtead.

Flight-Lieut. Christopher Thomas O'Neill, O.B.E., R.A.F. Medical Service, the son of John O'Neill, J.P., Sarsfield Court, Riverstown, Glanmire, Co. Cork, was married on January 16, at St. Andrew's Chapel, Belford Road, Edinburgh, to Jane Dorothy, daughter of the late William Laing, Nairn, and of Mrs. Laing, 30, Murrayfield Avenue, Edinburgh.

To be Married

The engagement is announced, and the marriage will take place on February 16, at 2.15, at All Souls, Langham-place, between Flying-Officer Ralph Woodcock Gifford Lywood, son of Colonel Lywood, of Alverstoke, and Margaret, younger daughter of Mr. and Mrs. F. J. Smith, of Alverstoke.

The engagement is announced of Flight-Lieut. H. S. Scroggs, R.A.F., only son of Commander H. C. Scroggs, R.N. (retired), and Mrs. Scroggs, Colden Common, Winchester, and Margaret Fray (Peggy), only daughter of Mr. and Mrs. E. E. Powell, Shawford, Winchester.

ROYAL AERONAUTICAL SOCIETY

Lecture.—On February 4, at 7 p.m., an important Joint Meeting with the Institution of Automobile Engineers will be held at the Royal Society of Arts, 18, John Street, Adelphi, W.C. 2. At this meeting, the third lecture of the second half of the Sixty-First Session, Mr. Charles L. Lawrance, Vice-President and General Manager of the Wright Aeronautical Corporation, will read a paper on "American Aircraft Engine Development." Mr. Lawrance is paying a special visit to this country in connection with the paper, and his lecture, in view of the recent advance in American engine design, will prove highly informative. Light refreshments will be served at 6.30 p.m.

New Branches.—A number of new branches of the Society are already in process of formation, following on the result of the Special General Meeting of the Society held on December 30, 1925. The membership of the first of these new branches to be formed, at Coventry, already exceeds 100.

New Grade.—The forms of application to the new technical grade of the Society, Associateship, are now ready. This grade is open to anyone employed in a technical capacity in the manufacture or operation of aircraft who have in the opinion of the Council sufficient qualifications to warrant their election. Full particulars of the rules governing the new grade, and the privileges, may be obtained from the Honorary Secretary.

J. LAURENCE PRITCHARD,
Honorary Secretary.

* * * *

CORRESPONDENCE

PROPOSED AMATEUR AIRSHIP CLUB

[2115] In view of the Government's drastic action by economising at the expense of practical airship research, may I suggest that the scheme recently put forward by Commander Boothby should receive more than passing comment in your valuable columns.

It is essential that our airship personnel should not be allowed to become "stagnant."

The formation of an Amateur Airship Club on practical lines would, to a small extent, provide a means of overcoming this stagnation, and, further, what in the writer's mind is of more importance, it would encourage the modern youth to take an active interest in the development and control of "lighter-than-air" machines.

In conclusion, the writer is of the opinion that Commander Boothby would receive enthusiastic support from all interested in the oldest branch of aviation.

H. ALEC S. GOTHARD, F.R.S.A.

Bickley, Kent.
January 23, 1926.

* * * *

R.A.F. Officers and Flying Risks

IN a memorandum recently issued by the Air Ministry it states that the question of insuring against flying risks is known to have exercised the minds of officers for some considerable time past and that there is reason to believe that particulars of methods by which various life offices are prepared to cover risks are not known. As a result, the Air Ministry has been in negotiation with the British Life Offices Association and has formulated two schemes, Scheme A and Scheme B. Under Scheme A, R.A.F. officers can cover the risks of flying by payment of a fixed annual extra; this extra varies according to the rank of the officer from five guineas per cent. for pilot officers to 15*s.* per cent. for an Air Commodore (no charge being made for officers above that rank), and is payable for a maximum period of five years. Under Scheme B the extra premium depends primarily upon the amount of flying done, the general charge being 9*d.* per flight per £100 assured, the amount of extra premium payable in any one year being determined by the production of a certified extract from the officer's log book.

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PUBLICATIONS RECEIVED

Technical Notes: No. 228.—The Flettner Rotor Ship in the Light of the Kutta-Jonkowski Theory and of Experimental Results. By F. Rizzo. October, 1925. *No.* 229.—An Altitude Chamber for the Study and Calibration of Aeronautical Instruments. By H. J. E. Reid and O. E. Kirchner. November, 1925. U.S. National Advisory Committee for Aeronautics, Washington, D.C., U.S.A.

International Meteorological Organisation: Report of the Meeting in London, April 16-22, 1925, *of the Commission for the Exploration of the Upper Air.* Air Ministry, Meteorological Office. M.O.281. H.M. Stationery Office, Kingsway, London, W.C. 2. Price 2*s.* net.

Aeronautical Research Committee, Reports and Memoranda.—*No.* 980 (*Ae.* 193.).—The Rolling and Yawing Moments of an Aerofoil in Straight Flight. By H. Glauert, M.A. July, 1925. H.M. Stationery Office, Kingsway, London, W.C. 2. Price 3*d.* net.

No. 4 *Apprentices Wing Magazine. Vol. IV, No. III. Christmas,* 1925. The Boys' Wing Magazine, R.A.F., Cranwell, Lincs.

The Official Gazette of the United States Patent Office. December 15, 1925. *Vol.* 341, *No.* 3. United States Patent Office, Washington, D.C., U.S.A.

The Canadian Patent Office Record. Vol. LIII. Nos. 49 *and* 50. *December* 8 *and* 15, 1925. Canadian Patent Office, Ottawa, Canada. Price 25 cents each.

La Guerra y su Preparacion. November, 1925. Vol. X, No. 5. Estado Mayor Central del Ejercito, Madrid.

Automobile Worm Gearing. David Brown and Sons (Huddersfield) Ltd., Park Works, Lockwood, Huddersfield.

Notiziario Tecnico. No. 6. *December,* 1925. Ufficio di Stato Maggiore della R. Aeronautica, Direzione della Rivista Aeronautica, Via Torino, 39, Rome.

Official Gazette of the United States Patent Office. December 22, 1925. *Vol.* 341, *No.* 4. United States Patent Office, Washington, D.C., U.S.A.

L'Annuaire du Bureau des Longitudes pour 1926. Gauthier-Villars et Cie., 55, Quai des Grands-Augustins, Paris. Price 8 fr. net.

Winged Defense.—By Wm. Mitchell. *New York and London*: G. P. Putnam's Sons. Price 10*s.* 6*d.* net.

The Official Gazette of the United States Patent Office, December 29, 1925.—The United States Patent Office, Washington, D.C., U.S.A.

* * * *

AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations: Cyl. = cylinder; i.c. = internal combustion: m. = motor. The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

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25,443. BRISTOL AEROPLANE CO., LTD., W. L. GARRETT and J. HALL. Bodies for vehicles. (245,229.)

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1,149. G. W. BRYANT and F. P. BEVIS. Rotary i.c. engines, etc. (245,277.)
5,085. ENGLISH ELECTRIC CO., LTD., W. E. M. AYRES and E. H. H. HASSLER. Method of and apparatus for balancing of bodies. (245,305.)
5,215. W. DE WASMUNDT. Valve-packing devices for revolving cylinder engines. (230,071.)
14,702. CIE D'APPLICATIONS MECANIQUES. Fastenings for shock absorber (235,219.)
17,643. H. JUNKERS. Screw propellers. (237,245.)

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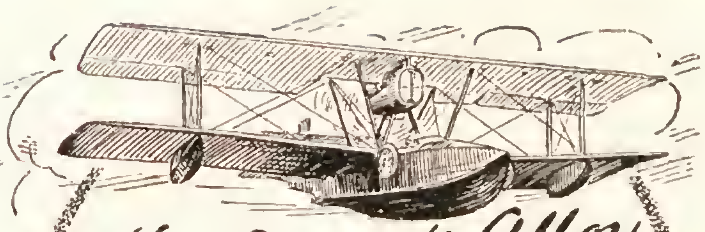

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Parnall, George, & Co., Coliseum Works, Park Row, Bristol.
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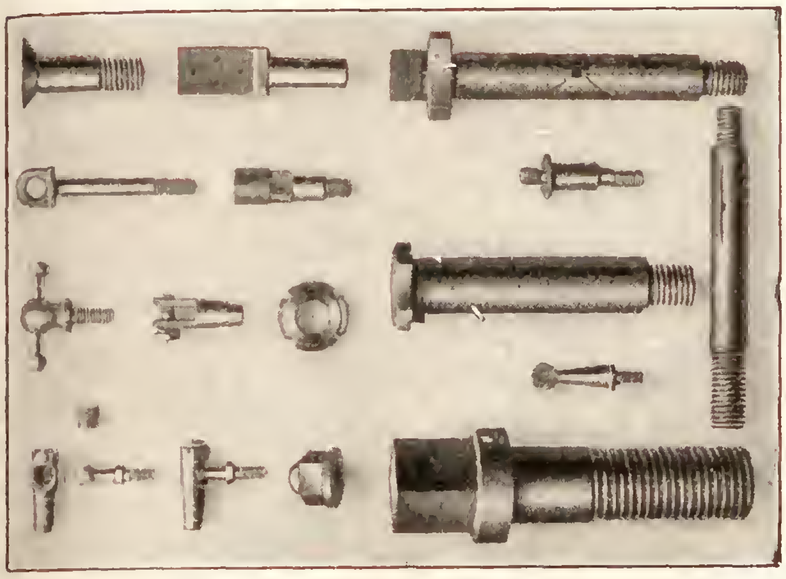

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The AIRCRAFT ENGINEER & AIRSHIPS

First Aero Weekly in the World

Founder and Editor: STANLEY SPOONER

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport

OFFICIAL ORGAN OF THE ROYAL AERO CLUB OF THE UNITED KINGDOM

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CONTENTS

	PAGE
Editorial Comment	
A Very Gallant Effort	57
Economy and Security	58
Spanish Trans-Atlantic Flight	59
The "Travel Air Special"	60
Royal Aero Club Official Notices	61
Light 'Plane Club Doings	61
The Airship Club	61
Sir Harry Brittain's Flight in Australia	62
How to Become a Service Pilot	63
Regulations for Citizen Air Forces	64
Vacancies for Aircraft Apprentices (R.A.F.)	65
Sir Charles Wakefield Hands Over "Moth"	66
A Remarkable Reliability Trial	67
Personals	67
Macready's Altitude 'Plane	68
Royal Air Force	69
R.A.F. Intelligence	69
Royal Aeronautical Society Official Notices	69
Air Post Stamps	70
Air Ministry Notices	70

DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:—

1926	
Feb. 25	Mr. A. J. Cobham. "Long-Distance Aeroplane Flights," before R.Ae.S.
Mar. 4	Maj. G. H. Scott. "Development of Airship Mooring," before R.Ae.S.
Mar. 9	Mr. O. E. Simmonds, M.A., A.F.R.Ae.S., M.I.Ae.S. "The Development of Civil Marine Aircraft," before Inst.Ae.E.
Mar. 18	Flight-Lieut. H. Cooch. "Landing Aeroplanes in Fog," before R.Ae.S.
April 13	Mr. S. H. Evans, B.Sc. "The Performance of Modern Aircraft—with special reference to the Variable Wing," before Inst.Ae.E.
April 15	Capt. G. T. R. Hill. "The Tailless Aeroplane," before R.Ae.S.
April 21	Inst.Ae.E. visit to Messrs. D. Napier and Son, Acton.

EDITORIAL COMMENT.

A Very Gallant Effort

ONCE more it becomes our pleasant duty to place on record the successful accomplishment of a very fine flight. We refer, of course, to the flight from Spain to South America by the Spanish aviators Comandante Franco (pilot), and Capt. Ruiz de Alda (navigator), Lieut. Duran, and Sen. Rada. A brief account of the adventurous undertaking is given elsewhere in this issue of FLIGHT, from which it will be seen that the aviators left Palos (the point of departure of Christopher Columbus in 1492) on January 22, and arrived at Pernambuco on January 28, having covered the distance of about 3,500 miles in a lapsed time of one week, and in a flying time of about 35 hours, or at an average speed of close upon 100 m.p.h. The longest "jump" was from the Cape Verde islands to Fernando Noronha, a distance of roughly 1,500 miles, which was accomplished in a little more than 14 hours.

It is a testimony to the reliability, airworthiness and seaworthiness of the modern flying boat that the Spanish crossing of the South Atlantic was accomplished during a period when an extremely severe gale raged in the North Atlantic, resulting in delay and damage to shipping, and in more than one actual shipwreck. It may be, of course, that the prevailing winds over the route followed by the Spanish aviators were in their favour and helped them to make such excellent time, but for all that, there was an opportunity for the machine to show its quality when it came down off Fernando da Noronha and the aviators had to spend the night on board, as the sea was too rough for them to be transferred to the destroyer standing by. Obviously the days have gone when seaplanes were fair-weather craft, and the Spanish flight has provided one more proof that in time we may reasonably hope to evolve seaplanes which will do as a normal part of their routine work flights which as yet are to be regarded mainly as isolated "dashes." For having furnished that proof the aviation world owes a debt of gratitude to the four intrepid Spaniards whose daring attempt has just been crowned with success.

The flight is claimed, and not unnaturally so, as a Spanish performance. Actually it was a very international affair. The crew were Spanish. The machine, a Dornier "Wal" was designed by the well known German designer, Claudius Dornier, of Friedrichshafen, on Lake Constance, and built under licence in Pisa, Italy. The two 450-h.p. engines were Napier "Lions," designed and built at Acton, London, and a great number of the instruments used were of British manufacture. Thus Great Britain can justly claim what one may, perhaps, be forgiven for terming the "Lions' share" in the adventure. That the "Lions" did their duty and did it well is amply evident, and it is a testimony to their stamina that when the propeller of the rear engine was damaged by the rough seas, the last part of the flight was completed with only one of the engines at work. This must necessarily have meant that after having been run for some 33 hours (a good deal of the time at or near maximum power) one of the "Lions" was then run to its full capacity for the last 100 miles or so. Yet apparently it was none the worse for its gruelling test.

One begins to realise the vast possibilities of a three-engined flying-boat, in which the stoppage of one engine deprives the machine of but one-third instead of one-half of its engine power. In this particular case the stoppage was, of course, due solely to the propeller and not to the engine.

We extend our heartiest congratulations to everyone concerned in this splendid flight, and wish the Spanish aviators all possible good fortune on the further stages of their flight.

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Economy and Security

The eleventh annual report of the American National Advisory Committee for Aeronautics has just come to hand, and although it is, of course, the administrative report without the technical reports, there is much in it of interest to British readers. On the subject of the American aircraft industry, a passage occurs which we quote below, as it has a very distinct bearing upon the position in this country at the present time. The passage, which is headed "The Problem of the Aircraft Industry," reads as follows: "In its tenth annual report, the committee outlined the relation of the aircraft industry to national defence, and emphasised the need of maintaining a satisfactory nucleus of an industry. This was defined as 'a number of aircraft manufacturers distributed over the country, operating on a sound financial basis, and capable of rapid expansion to meet the Government's needs in an emergency.' The committee presented certain definite suggestions of steps to be taken by the Government and by the industry to meet the situation that existed at that time. There has been substantial progress during the past year along the lines outlined by the committee, and it is believed that the condition of the industry and the relations of the Government to the industry have been much improved. *The greatest single factor in bringing about this improved condition has been the increased volume of Government orders for aircraft made possible by increased appropriations and contract authorizations for the purchase of aircraft.* The present situation, on the whole, may be regarded as more satisfactory at this time, and as offering promise of further improvement."

The italics are ours. The fundamental principles involved are the same in America as here, and this statement, coming from the body governing research in the United States, draws attention to a basic fact which, if rumour be true, is apparently being overlooked in this country at the present time. It is accepted as a piece of reliable information that in the forthcoming Air Estimates it is intended to suggest considerable reductions in air expenditure, and particularly that these reductions are to be effected under Vote 3A (aeroplanes, seaplanes, engines and spares).

At the luncheon given by the Air League of the British Empire recently, Mr. Fairey stated the position fearlessly, clearly and, we think, moderately. The British Aircraft industry has settled down under the present conditions to steady progress, but it will take but very little to upset the balance, as the number of orders that have been received by the industry have been only just sufficient to keep all the twenty or so firms in the industry, and that to a very large extent because it had been accepted as a definite understanding that the present rate of expansion would be maintained for several years. If that expansion is slowed down, more than one aircraft firm will have to close down, and designing staffs will be lost. For each firm closing down the Royal Air Force would be deprived of the supply of machines which that firm could, and would, provide in time of emergency. It is estimated that the British aircraft industry as at present composed, is just sufficient to meet an emergency, should it arise. A reduced industry, would *not* be sufficient, and the proposed "cuts" would seriously hamper the air forces and would actually, in the opinion of many, reduce our "factor of safety" to a dangerous extent.

The American N.A.C.A. annual report shows how seriously America is treating her air problem. Yet America's position is in no way comparable with ours, and the time when an air attack on the United States becomes a possibility is still a long way out in the future. In the case of Great Britain, every day, every step forward in progress, adds to the risk we are running. Research is necessary if we are to progress, but orders for machines and engines are a vital necessity if our industry is to be kept alive. Yet, apparently, those in authority are contemplating not merely a slowing-up of progress but the decimation of that industry. Truly, the slogan "Wake up England," was never more needed than at the present time, and it is to be hoped that the general press will unite in using its influence to prevent from being made what we feel would be one of the most disastrous mistakes of recent years.

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The Spanish Transatlantic Flight

The Air Ministry announces that Sir Samuel Hoare, has sent the following telegram to the Minister of War, Madrid:—

"Air Council have learned with great pleasure of successful completion of Transatlantic flight by Comandante Franco and Captain Alda. They desire to offer Spanish Army Air Service cordial congratulations on most brilliant achievement."

D. Napier and Son, Ltd., have received from Sir Samuel Hoare, Secretary of State for Air, the following telegram:—

"I congratulate you on fresh success secured by Napier engines in Transatlantic flight by Spanish Army Air Service. This achievement is one more proof of the unexcelled reliabilities of the products of the British aircraft manufacturing industries."

R. M. KINDERMAN
COLLECTION

THE SPANISH TRANSATLANTIC FLIGHT

Once again has the Atlantic been crossed by air, for Comandante Franco, accompanied by Capt. Ruiz de Alda (navigator), Lieut. Duran, and engineer Rada, who left Palos de Moguer, Spain, on January 22, has succeeded in reaching Pernambuco, Brazil, in the Italian-built Dornier-Wal flying-boat, fitted with two Napier "Lion" engines.

As briefly reported last week, they successfully completed the first stage of about 900 miles to Las Palmas (Canary Is.) on January 22, when bad weather prevented a resumption of the flight until January 26. They then completed another stage, of roughly 1,000 miles, to Cape Verd Islands. In the early hours of the morning of January 30, they set out on the most difficult section of the journey—a flight of 1,500 miles across the Atlantic Ocean to Fernando Noronha, an island some 300 miles off the coast of Brazil.

Just before eight o'clock that evening they were sighted from the island of Fernando Noronha, and shortly after passed overhead in the direction of Pernambuco. They had not gone far however, when they were seen to descend on the sea and signal for assistance. It appears that as they were running short of fuel and weather conditions were getting somewhat rough, they decided it would be unwise to proceed.

Eventually they succeeded in getting back into Fernando Noronha, but the sea was then so rough that boats were unable to reach the machine and take them ashore. Throughout the night, therefore, Comandante Franco and his companions was forced to remain on board the seaplane, "Ne Plus Ultra." On the whole, the machine rode out the storm well, but one of the propellers was damaged.

However, Comandante Franco had succeeded in accomplishing the second longest non-stop over-sea flight yet made (the longest was that made by the late Sir John Alcock on the occasion of his flight from Newfoundland to Ireland (1,890 miles) in 1919) having covered a distance of 1,500 miles in less than 14 hours.

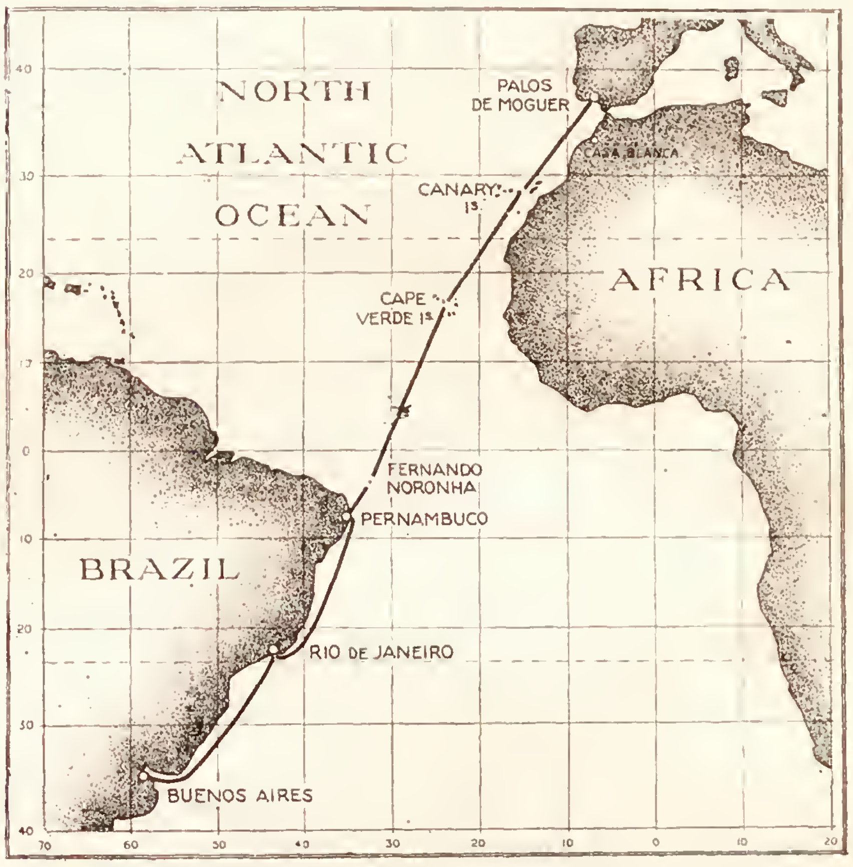
At 3 p.m. next day they made a start for Pernambuco, 300 miles away. Just as they were within sight of their goal the propeller, previously damaged the night before, refused to carry on any longer, and they had to make a hasty conclusion (for about 100 miles) of their flight on only one engine. They did not, therefore, fly round the town of Pernambuco before landing, as originally intended; but landed just outside. Boats at once went to their assistance, and after the machine was safely made fast to its moorings, the airmen were taken on board a Brazilian destroyer and brought ashore.

[*Photo.: Marconi Co.*

THE SPANISH TRANSATLANTIC FLIGHT: **The Dornier-Wal metal mono flying-boat, fitted with two Napier "Lion" engines, on which Maj. Franco flew from Spain, across the Atlantic, to Pernambuco.**

They were accorded a wonderful reception at Pernambuco on their arrival, enormous crowds lining the three miles of quays cheering enthusiastically, whilst ships and tugs in the harbour supplied the triumphal Jazz march.

The total distance flown up to now is about 3,800 miles, and the total flying time amounts to 35 hours 20 mins—or at an average speed in the neighbourhood of 100 m.p.h. The success of the flight so far has caused immense enthusiasm both in Spain and South America, and Comandante Franco has received numerous congratulatory messages, including a cablegram from King Alfonso. Except for the engines and minor details the "Ne Plus Ultra" is similar to the Dornier flying-boats used by Amundsen in his recent Polar flight.



THE SPANISH TRANSATLANTIC FLIGHT:—Sketch map showing the route of the Spanish flight from Spain to South America.

It has been specially equipped for this Transatlantic trip with a Marconi AD6 aircraft telephone transmitter and receiver of the type which has been adopted as the standard wireless telephone fitting for British civil aircraft, and which has rendered good service on commercial airways in many parts of the world. A Marconi type 14 direction finder has also been fitted for navigational purposes, and the Marconi Company has arranged with its affiliated wireless companies in South America to keep in touch with the aeroplane when it approaches South America and as it is flying along the coast from Pernambuco to Buenos Aires.

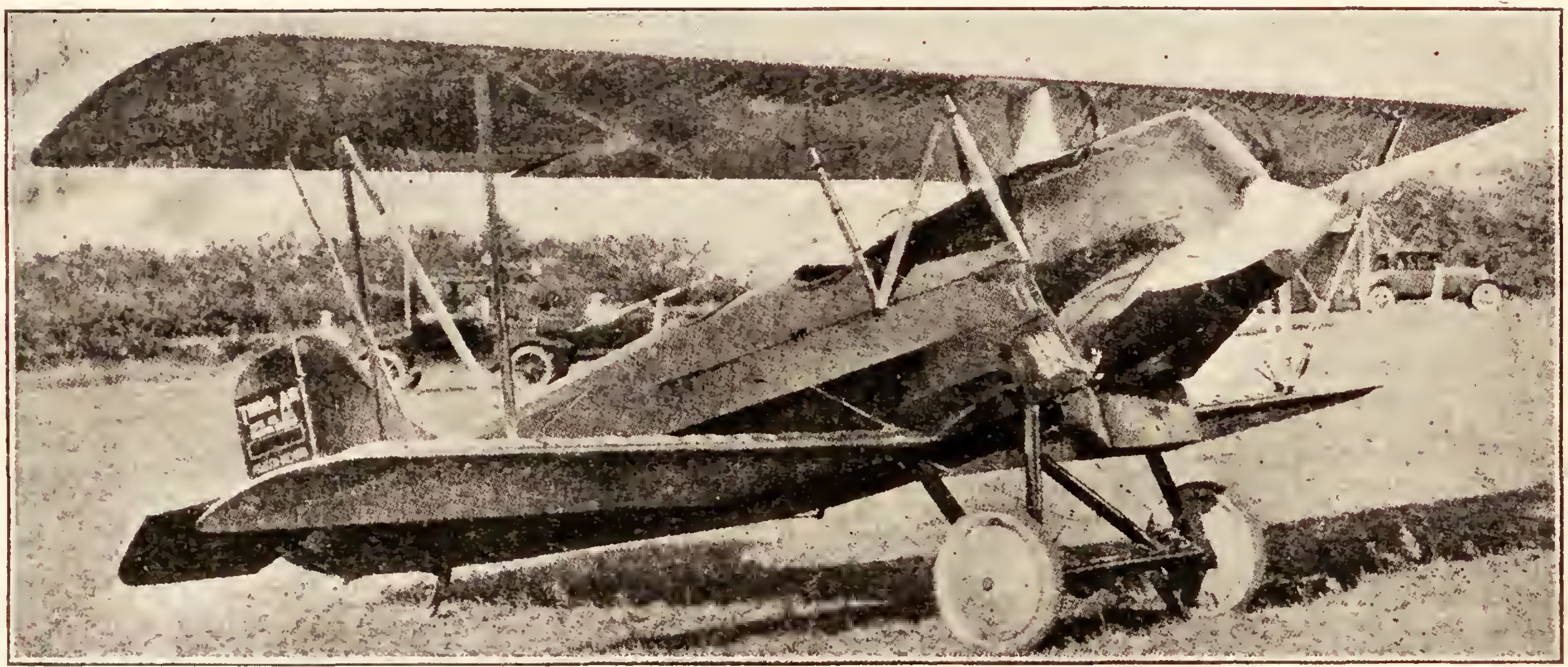
THE "TRAVEL AIR SPECIAL"

An Efficient American General Purpose Machine

In order to meet an exceedingly popular demand that exists in America for a small, medium-powered machine, for fast passenger or express-carrying cross-country work, several of the aircraft constructing firms in America have concentrated their efforts in this direction. One such machine, described herewith through the courtesy of our American contemporary, *Aviation*, is the "Travel Air Special," which put up an excellent performance in last year's Ford Reliability Aeroplane Tour.

This machine, which is produced by the Travel Air Manufacturing Co., of Wichita, Kan., was designed by Lloyd Stearman and MacShort, engineers of the company. Perhaps one of the most interesting, and certainly very significant, features of the design is the fact that the designers have kept their production within strict accord with the specifications laid down by the Aeronautical Safety Code.

It is worthy of note that six weeks after the decision was arrived at by the executives of the company to construct the machine, it had been flight tested and entered in the Air Meeting held at Tulso, Oklahoma, during the first week of September last. As an example of rapid construction of an entirely new design, the accomplishment is remarkable, especially when it is recalled that production of the standard model was not licensed during this period.



THE "TRAVEL AIR SPECIAL": An American four-seater commercial biplane, fitted with a Curtiss C 6A 160 h.p. engine.

In some respects the "Travel Air Special" possesses several of the characteristics of the standard OX model produced by this firm. The fuselage is of welded steel tubing with bracings of tubing and wire. The engine mounting, also of steel tubing, is made a detachable unit.

The wings are of wood and fabric construction with box spars and built-up ribs, and interplane bracing is secured by N struts of streamline steel tubing, together with streamline bracing wires. The upper plane, which is larger in span and chord, is straight, and is supported above the fuselage by two pairs of N struts. It is in three sections—two outer ones attached to a small centre panel. The ailerons, mounted in the top wings only, are operated by the standard Travel Air method of push and pull rods carried in the lower plane, thence through bell cranks and aileron struts. By this means the elimination of pulleys in the control system has been made possible.

The tail surfaces are of steel tubing and stamped steel ribs, the horizontal surface being adjustable as to incidence from the cockpit—a refinement, desirable, but not usually found on machines of this type.

A total seating capacity for four persons is provided on this machine, the rear cockpit being very large, with dimensions, that permit the seating of the pilot and a passenger. The controls are so arranged that they can be off-set to allow for the lateral shifting of the pilot's position.

The forward cockpit—located at the trailing edge of the top plane—seats two persons, and entrance to it is effected by a convenient door in the fuselage. If required, this cockpit can readily be converted into an express goods or mail compartment of 22 cub. ft. capacity. Furthermore, if dual control is desired, forward cockpit controls can be installed quickly. Luggage is accommodated in a compartment located directly back of the pilot's cockpit.

A Curtiss C 6 A (160 h.p. at 1,750 r.p.m.) engine is installed, well cowled in. A free air radiator is mounted under the engine, and water temperature is controlled by retracting the radiator into the engine compartment and shuttering the exposed surface.

The cleanness of design throughout is apparent from the accompanying illustration—the streamlining of the landing gear and exposed fittings having been carried out in detail.

The excellent performance of the "Travel Air Special" has been demonstrated at the Tulso meeting, and in the Ford Reliability Tour. Walter Beach, manager of the Travel Air Co., piloted the machine in these events, and it may be mentioned that this was one of three Travel Air machines that finished the Ford Tour with a perfect score.

The principal characterisitcs of the "Travel Air Special" are :—

Span (top)	31 ft. 6 in.
Span (bottom)	25 ft. 2 in.
Chord (top)	5 ft. 0 in.
Chord (bottom)	4 ft. 0 in.
Height	8 ft. 8 in.
Total wing area	240 sq. ft.
Weight, empty	1,460 lbs.
Weight of pilot, fuel, oil, &c.	582 lbs.
Normal pay load	500 lbs.
Weight, fully laden	2,542 lbs.
Weight, per sq. ft.	10·6 lbs.
Weight, per h.p.	15·9 lbs.
Speed range	48-120 m.p.h.
Cruising range (100 m.p.h.)	5 hours.
Fuel capacity	57 gals.
Oil capacity	5 gals.

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A Night Flight from Paris

A French Farman Goliath, piloted by M. Codon, made a night flight between Paris and Croydon on January 27.

Col. Mitchell's Sentence Modified

It is announced that President Coolidge has modified the Court-martial sentence passed last December on Col. Mitchell, of the U.S. Air Service, to the extent that Col. Mitchell shall receive all his Army allowances and half his pay during the five years' suspension.

Swiss Pilot Killed

The Swiss pilot Lieut. Reichwein was killed in an aeroplane accident at Wohlen on January 26.

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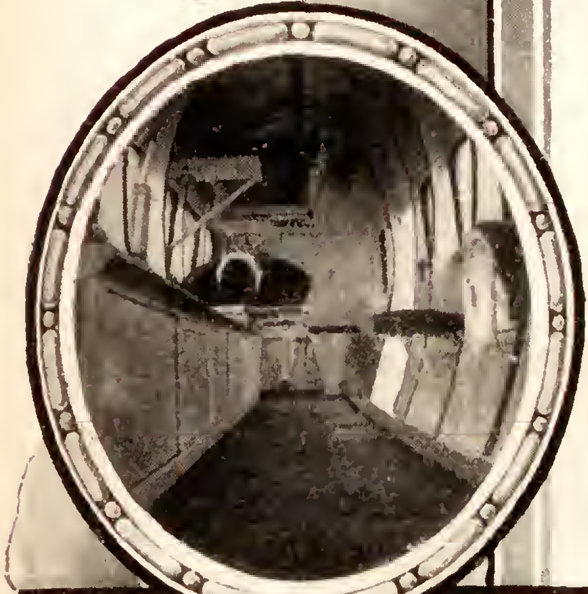

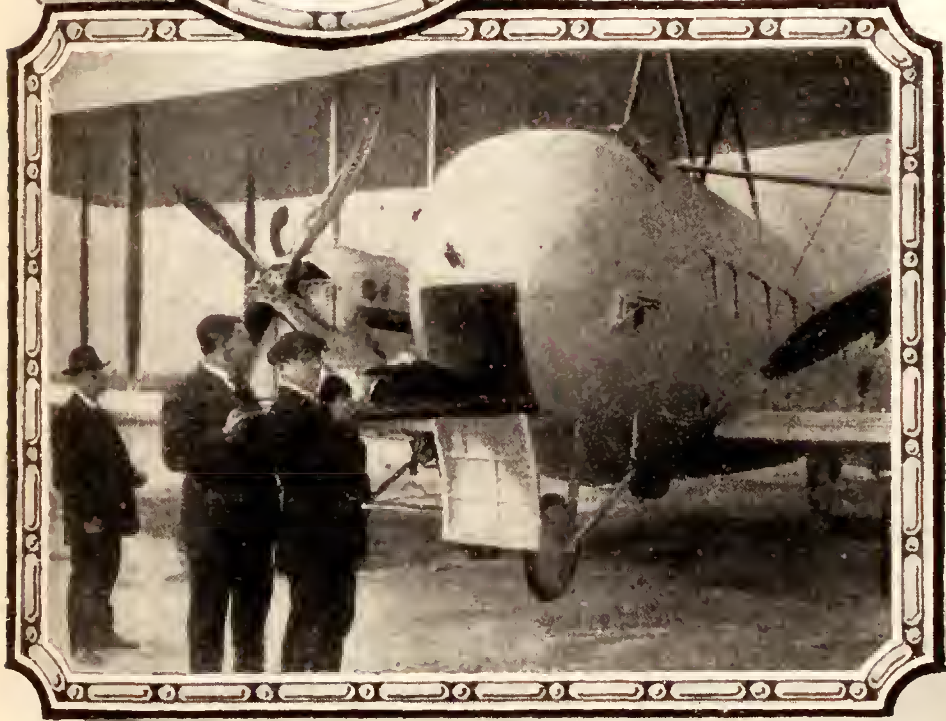

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Fitted with twin 450 h.p. Napier "Lion" engines the "VIMY" has accommodation for a crew of two and Doctor, Nurse, and four stretcher cases or eight "sitting-up" cases.

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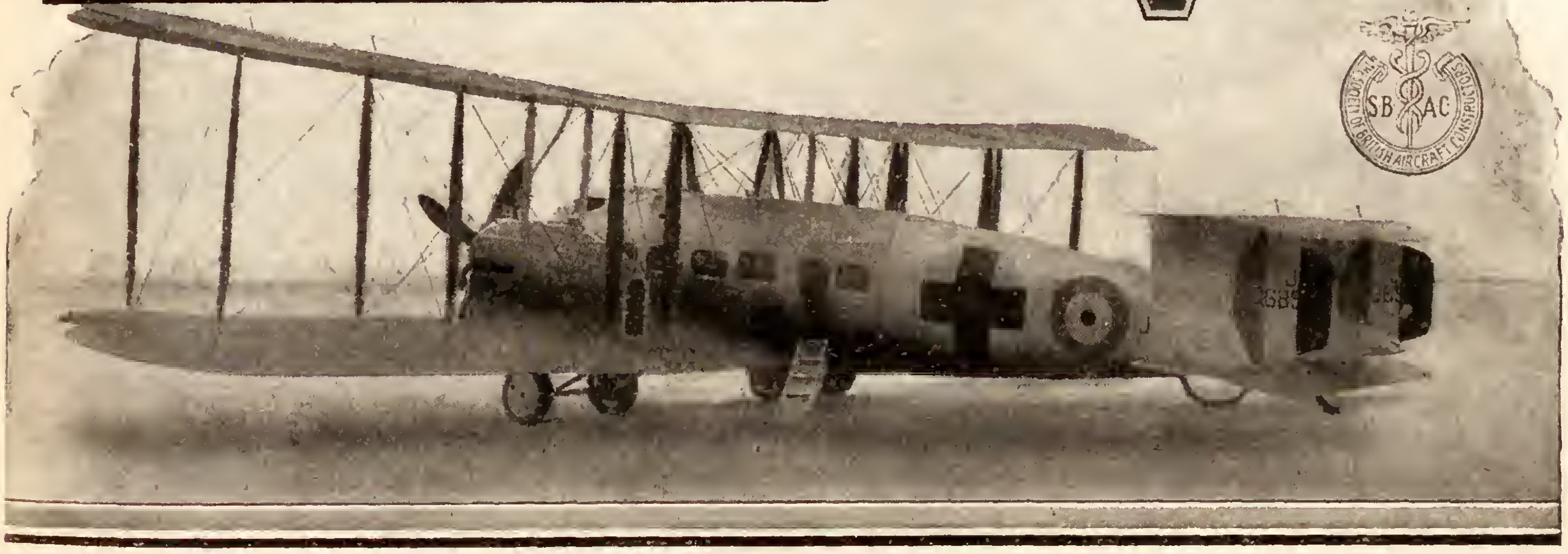

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300 h.p. F.I.A.T.	300 h.p. Hispano-Suiza.
230 h.p. Siddeley "Puma."	210 h.p. Wolseley "Viper."

80 h.p. Renault.

200 h.p. B.R.2.	130 h.p. Clerget.
110 h.p. Le Rhone.	100 h.p. Monosoupape.

In addition to the above, we are manufacturers of the 27/60 h.p. A.D.C. "CIRRUS" and 120/140 h.p. A.D.C. "AIRDISCO" engines.

Every engine before despatch from our works is dismantled for inspection, and after reassembly is given a test run under the supervision of our qualified and approved inspection staff.

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The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

SCHNEIDER INTERNATIONAL SEAPLANE RACE, 1926

THE Schneider International Seaplane Race will be held in Norfolk, Virginia, U.S.A., on October 24, 1926. British entries, together with entry fee of £5 and the deposit of £50, must be received by the Royal Aero Club, not later than Monday, March 22, 1926.

GORDON BENNETT BALLOON RACE, 1926

BRITISH entries for the Gordon Bennett Balloon Race, 1926, together with entry fee £10, must be received by the Royal Aero Club, not later than Monday, March 22, 1926. The Race for the Gordon Bennett Balloon Cup will be held during the month of May. The exact date will be announced later.

ANNUAL GENERAL MEETING

The Annual General Meeting of the Members will be held at 3, Clifford Street, London, W.1, on Wednesday, March 31, 1926, at 6 p.m.

Notices of Motion.—Notices of Motion signed by at least five members, must be received not less than 21 days before the meeting.

Election of Committee.—Nominations for the Committee, signed by two Members, must be received not less than 14 days before the Meeting.

Offices : THE ROYAL AERO CLUB,
3, CLIFFORD STREET, LONDON, W.1.
H. E. PERRIN, Secretary

LIGHT 'PLANE CLUB DOINGS

London Aeroplane Club

FLYING instruction was only possible on two days during the past week and then only to a very limited extent. With one D.H. "Moth" only available the total flying for the week was eight hours. The following members had flying instruction :—J. S. M. Michie, F. C. Elford, Mrs. Atkey, S. C. Richards, R. C. Brighten, Sir John Rhodes, W. Hay, R. P. Cooper, S. O. Bradshaw, H. R. Ogston, H. O. Richardson, C. E. Murrell, P. Johnson, N. Jones, K. V. Wright, H. R. Thomas.

Solo flights were made by G. H. Craig and Mrs. Eliott-Lynn.

The total flying time for the month of January was 53 hours 15 mins., and practically all this has been done on the one machine.

The Lancashire Aero Club

FLYING took place on Friday, Saturday and Sunday.

Mr. Scholes being away for the week-end on some nefarious work, the whole of the flying devolved on Mr. Cantrill.

The following victims had "dual" :—Messrs. C. A. S. Parker, B. H. Smith, T. Hardy, C. Colley, R. Tummers, H. Michelson, H. S. Stern, R. R. Williams, J. Goodyear, T. Wilkinson, M. Lacayo, C. Crabtree, J. H. Chadwick. Mr. Lacayo did 5 mins. solo. Total flying time was 8 hours 35 mins. Tests occupied 20 mins.

There is now quite a queue of people waiting to go for their tickets, but whilst our barograph "graphs" quite well it persistently refuses to "baro." When this is remedied we hope to develop "A" licencees like mushrooms.

The Newcastle-upon-Tyne Aero Club

TOTAL flying time for the week ending January 31, 1926, 11 hours 50 mins.

Dual Instruction, with Major Packman.—Miss C. R. Leathart (3 flights 1 hour 45 mins.) ; Mr. J. A. Somerville (2 flights, 65 mins.) ; Mr. G. H. Twine (30 mins.) ; Mr. J. D. Irving (2 flights, 65 mins.) ; Mr. J. Bell (20 mins.) ; Mr. C. Thompson (30 mins.) ; L. Smith (2 flights, 60 mins.) ; J. M. Campbell (15 mins.) ; Mr. A. D. Bruce (30 mins.).

Solo.—Mr. P. F. Heppell, 3 flights totalling 1 hr. 15 mins., with the following as passengers :—Mr. I. Stanley, Mr. H. Ellis and Mr. Nettleton. Mr. W. Baxter Ellis, 2 flights, with Mr. Metcalf and Mr. Sutherland as passengers. Mr. Thompson, 2 flights—35 mins.

Passengers with Major Packman :—Miss Skelton, Miss Tommay, Miss Cochrane.

The propeller of LX was damaged on Saturday, just before noon, but a new one was delivered, from De Havilland's at night and the machine was hard at work again by 10.30 on Sunday morning. The promptness of despatch of this necessary item of "Moth" equipment enabled flying to be carried out on Sunday as usual, though many members were disappointed on Saturday afternoon. Despite all the efforts of those members who have flown during the month, "Novocastria" (LX) finished up in perfect trim, with 62 hours 11 mins., of the total of 69 hours 24 mins., for the month to her credit.

Mr. Ellis's "Gull" has now grown its wings, and, possibly because it is rather large for that portion of the hangar allotted to it, Mr. Brown is busy clipping its wing (tips). The engine is now on rail, and it is hoped to have it in the air very soon.

THE AIRSHIP CLUB

THE Airship Club was inaugurated on January 31 at a meeting held at 3, Clifford Street, London, W. 1, when Mr. Griffith Brewer, Chairman, moved and Lieut.-Col. the Hon. Claude Brabazon seconded "that the Airship Club now be formed." The resolution put to the meeting was carried unanimously. The following members were elected and requested to serve on the Committee :—

Capt. W. G. Aston.
R. M. Balston, Esq.
Lieut.-Col. the Hon. Claude Brabazon, O.B.E. (late Irish Guards).
Comdr. F. Boothby, O.B.E., R.N. (retired).
Griffith Brewer, Esq., Chairman.
The Lord Cunliffe.
The Hon. F. Eveleigh de Moleyns.
Lieut.-Col. Lockwood Marsh, C.B.E.
Lieut. R. L. Preston, Coldstream Guards.
Maj. C. C. Turner, R.A.F. (retired).
Wing-Commander A. C. Winter, R.A.F.

It was resolved that a limited company be formed to take over the assets and liabilities of the Airship Club, the company to be called "Airship Clubs, Ltd.," with a capital of £100 divided into 2,000 shares of 1*s.* each. Each director to hold one share, and to be a member of the Committee of the Airship Club.

Formal applications made to the Air Ministry for the club to be recognised and granted a subsidy accorded at present to light aeroplane clubs, and permission to use the airship shed at Pulham with the use of a portion of the officers' mess, was requested.

It is proposed to acquire an airship of 70,000 cub. ft. capacity fitted with two Cirrus engines as the club training ship, and arrangements have been made whereby members of the club may purchase small airships of 44,000 cub. ft. capacity fitted with one Cirrus engine or two Blackburne engines for £2,000 or £2,300 respectively. It is hoped to arrange for the use of the airship shed at Moreton, near Dorchester, which would be convenient to naval officers.

Applications for membership, enclosing the first year's subscription (£3), should be forwarded to Griffith Brewer, Esq., Chairman of the Airship Club, c/o The Royal Aeronautical Society, 6, Albemarle Street, W. 1.

It is decided that members should pay a subscription of £3 per annum and 30*s.* per hour flying time, with a small extra fee for instruction as pilots for those who desire it.

F. L. M. Boothby, R.N. (retired),
Hon. Secretary.

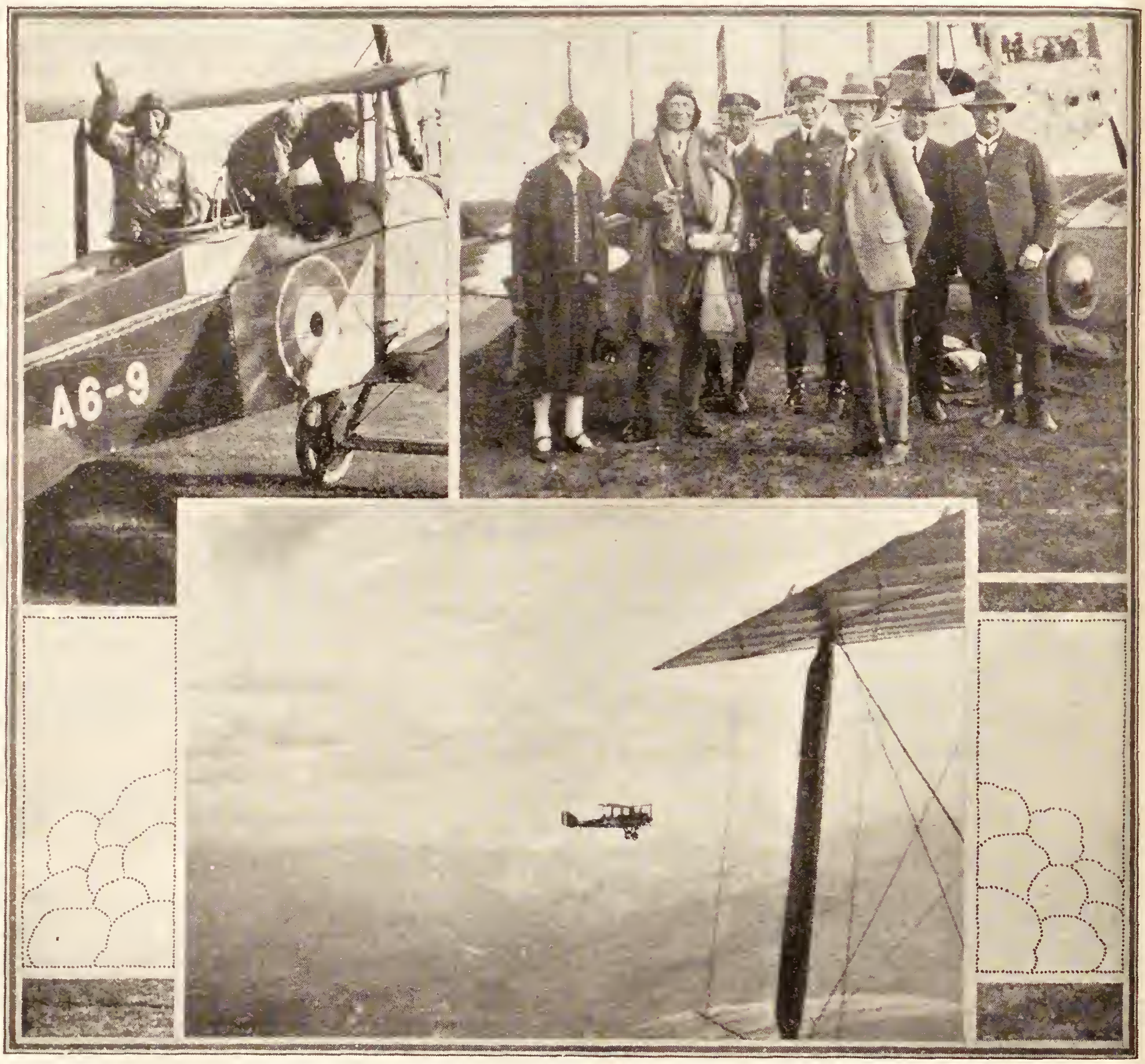
H.M.S. "Glorious" as Aircraft Carrier

THE cruiser H.M.S. "Glorious"—which was completed in 1917—is to be converted into an aircraft carrier, and £100,000 has been set apart, as a first instalment for this work, in the Navy Estimates. Owing to the closing down of Rosyth, where such work is allocated, the "Glorious" has been transferred to Devonport Dockyard, where the "Courageous"—a sister ship—is being similarly converted.

SIR HARRY BRITTAIN'S FLIGHT IN AUSTRALIA

Almost every day one sees further use being made of aircraft as a means of efficiently and quickly fulfilling certain missions—but even so we feel convinced that business and professional men could considerably extend this use if only they would appreciate the advantages and possibilities awaiting them in the employment of aircraft.

As a case in point, Sir Harry Brittain, M.P., a Director of D. Napier and Son, Ltd., has recently returned from a tour of the world in connection with the third Imperial Press Conference. While Sir Harry was in Australia, where this conference was held, he read a paper on "Inter-Empire Air Communications," and of course took the opportunity of studying the air communications existing in that country. Naturally, he was somewhat restricted as to time, so he gladly availed himself of an opportunity of a flight round Victoria, and in one day he covered approximately 700 miles.



SIR HARRY BRITTAIN'S AUSTRALIAN FLIGHT: Our illustration shows, on the left (top), Sir Harry Brittain, M.P., about to start on his recent aerial tour of Victoria from Point Cook aerodrome. On the right he is seen on his arrival at Ehuca with the Mayor (third from right) and his daughter (extreme left), and his pilot (centre), F/O. B. E. Wilson, R.A.A.F. Below is a view of Sir Harry's D.H.9, taken from another machine whilst flying at 2,000 ft. near the Mountains of Ararat.

Thus, he was able to see more of the country—and thereby obtain a considerable amount of data—in that one day than the other delegates could have seen in weeks.

For his flight Sir Harry started from the headquarters of the Royal Australian Air Force, Point Cook aerodrome, 15 miles from Melbourne. Incidentally, this aerodrome is ideally situated as it is right on the sea where seaplanes also operate. He used one of the R.A.A.F. D.H. 9's (240 h.p. Siddeley "Puma"), and was piloted by Flying-Officer B. E. Wilson, R.A.A.F. During his tour of Victoria he passed over Geelong, the Ararat Mountains, Bendigo, a big mining town, to Ehuca on the borders of New South Wales, and Victoria.

The Australian Air Force at the present moment is composed chiefly of gift machines, although latterly newer types have been purchased, among which may be mentioned the Supermarine-Napier "Seagull" amphibian, a number of which are being despatched during the next few weeks.

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Governor of Punjab

On January 25 Sir Malcolm Hailey, Governor of the Punjab, flew from Lahore to Rawal Pindi in a D.H. 9a biplane, and thus commenced an aerial tour of this district—the first time an Indian Provincial Governor has employed an aeroplane for official duties. Let us hope the habit will spread.

AVRO

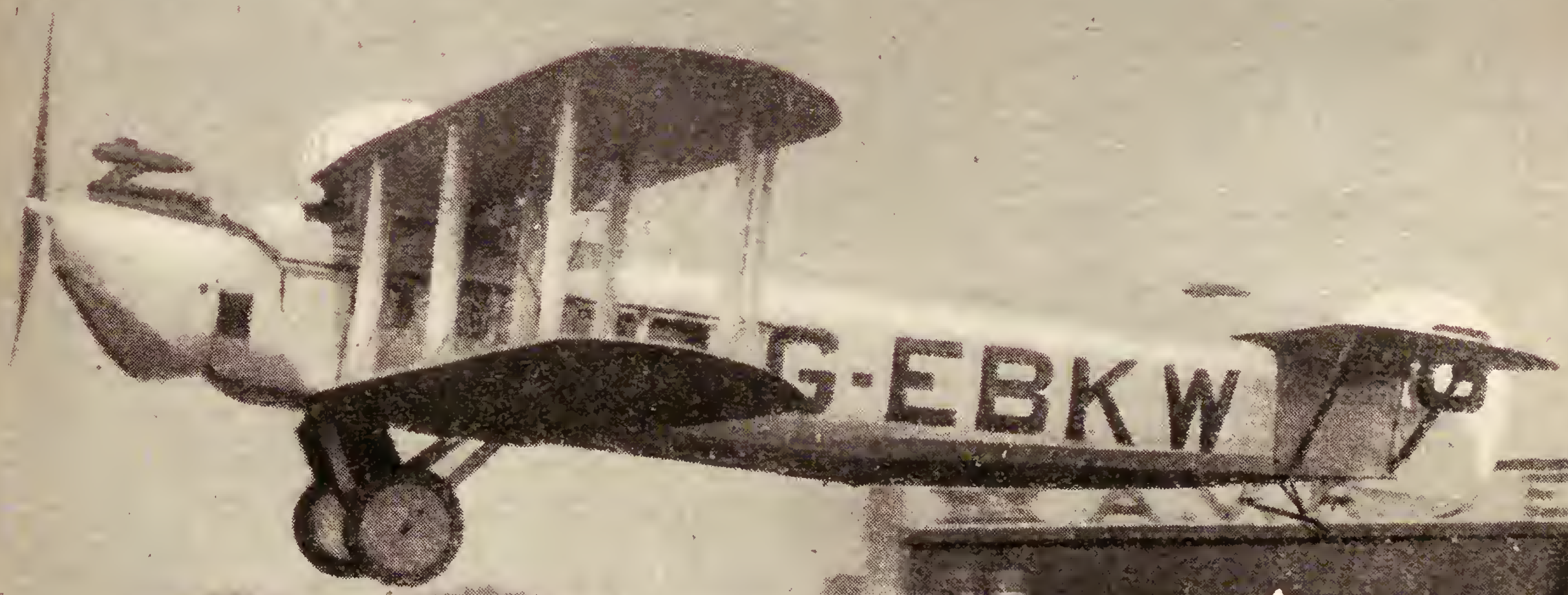
THE machine illustrated below, which is used by Imperial Airways, Ltd., as a freight carrier, is an outstanding example of AVRO design and construction.

It can also be operated as a passenger machine to carry twelve passengers in addition to pilot, navigator and attendant, or as a troop carrier.

A Rolls-Royce "Condor" engine is fitted, and a speed of 115 m.p.h. can be attained.

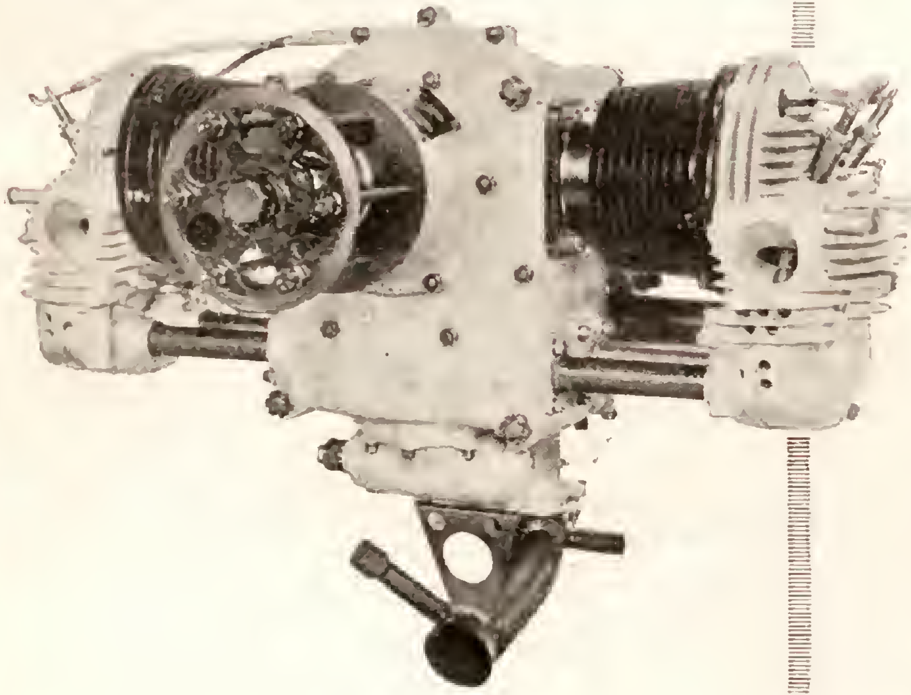
Enquiries, either for standard or specially designed machines are invited.

A. V. ROE & CO., LTD., Avro Works,
Newton Heath, MANCHESTER.
London Office: 166, Piccadilly, W.1.
Experimental Works: Hamble, Southampton.



The AVRO Single-engined freight carrying machine.

A RECORD WORTH BOASTING ABOUT



At every flying meeting in Europe and U.S.A. during 1924 and 1925 in which aircraft fitted with the

"Bristol"

CHERUB AIRCOOLED AERO ENGINE

took part the Cherub gained the premier awards.

Designers and Manufacturers :—

THE BRISTOL AEROPLANE CO., LTD.,
FILTON — BRISTOL.

Telephone—3906 Bristol. *Telegrams—"Aviation, Bristol."*

BRITISH AIR MINISTRY 100 HOUR TYPE TEST.

The New Series III. Cherub engine has completed a 100 hours' official Type Test with the highest success, the ten non-stop runs of ten hours each being completed without any hitch, adjustment or replacement. During the last hour the engine held 36.6 H.P. at 3,200 R.P.M. At the conclusion of the tests the engine was stripped for inspection and the official report states: — "The general condition of the engine was excellent."

BRIEF SPECIFICATION.

Bore and Stroke:—3.54 in. by 3.80 in. 90 m.m. by 96.5 m.m.

Total Stroke volume:—75 c.ins. 1,228 c.cs.

Compression Ratio:—5.5 to 1.

Power at Normal R.P.M.:— 33 B.H.P. at 2,900 R.P.M.

Power at Maximum R.P.M.:— – 36 B.H.P. at 3,200 R.P.M.

Weight Dry:—95 lbs.

R. M. KINDERMAN
COLLECTION

HOW TO BECOME A SERVICE PILOT

Enquiries are constantly received by the Editor of Flight from correspondents who wish to become pilots in one or other branch of the air force, but who do not know which branch to select or what step to take first. A certain mystification on the part of the most intelligent inquirer is more than excusable, for the dull blue uniform, which typifies the normal hue of the British skies, covers a greater multitude of services than can contrive to hide beneath the dark blue of the navy or the khaki of the army. During the war some people did get confused among R.N., R.N.R., R.N.V.R., and R.N.A.S.; and some dear old ladies were overheard arguing as to whether Lord Kitchener's army was better than the army of King George. But when it comes to all the air forces, Royal and otherwise, one may be excused for recalling and adapting the lines of Lewis Carroll:—

> But it fairly lost heart, and outgrabe in despair,
> When the *fifth* repetition occurred.

Yes, Dear Reader, though you may find it hard to believe, there are five categories of commissioned pilots serving H.M. the King—and even that leaves out of account the naval officers who are piloting in a seconded, attached, posted, or other capacity. Let us enumerate the five categories.

1. Officers of the Royal Air Force, regular and permanent.
2. Officers of the Royal Air Force who are regular but not permanent, holding only short service commissions.
3. Officers of the Royal Air Force Reserve.
4. Officers of the Royal Air Force Special Reserve.
5. Officers of the Auxiliary Air Force.

We will take each category in turn, and attempt to make the situation clear in brief language. Many points of more or less importance must be omitted for want of space, but the following remarks may serve as a guide to the Editor's correspondents in selecting the category most suited to their needs. When that choice has been made, it is a simple matter to procure the appropriate volume of regulations through any bookseller.

1. The Royal Air Force, Regular and Permanent

This is a career, and a very fine career, too. Moreover, it is not at all badly paid. A pilot officer starts on 16*s*. per diem, and a flight lieutenant, after two years' service in that rank, receives 28*s*. p.d. There are three ways of obtaining a permanent regular commission:—(*a*) Through Cranwell Cadet College, (*b*) through a recognised University, and (*c*) by selection after holding a short-service commission. In this article we are not considering promotions from the ranks.

2. Short-Service Commissions

This category may deserve the careful consideration of some of the Editor's correspondents. It is one way in which a man may be taught to fly at Government expense without taking up service flying as his life's career. His obligation is only five years on the active list, and four years on the R A.F. Reserve. Gentlemen between the ages of 18 and 29 who believe that if only they could provide for themselves for the next five years, they would then find handsome openings in aerial transport for a good pilot (as we sincerely hope that there will be) might do much worse than apply for a short-service commission. The first step is to procure the form of application, Air Ministry form 696, and to do so a letter should be addressed to :—The Secretary, Air Ministry, Kingsway, London, W.C.2.

3. The Royal Air Force Reserve

This must be carefully distinguished from the R.A.F. Special Reserve Squadrons, which are dealt with below. Probably, at the present time, though not necessarily in the future, this category will be the one chosen by the majority of the Editor's inquirers. There are seven classes of officers in the R.A.F Reserve, according to whether they are employed on flying or technical duties, and whether they have previously held a commission and received instruction or need training *ab initio*. This article is intended for the guidance of men who want to be taught to fly. If they want the Air Ministry to bear all responsibilities, financial and other, of their training, and if they do not want to spend five years in the R.A.F., and if they do not reside in Northern Ireland, then they will probably decide in favour of the R.A.F. Reserve.

The Reserve is not organised in squadrons. When an emergency arises its personnel will be merged in that of the R.A.F., and in that respect it resembles the Royal Naval Reserve. The initial period of service is for four years, which may be extended by mutual consent of the Air Ministry and the officer. When called up for service officers receive exactly the same pay and allowances as the R.A.F. Pay and allowances are also given during annual training. Officers employed on flying duties also receive a retaining fee of £30 p.a. They are not obliged to wear uniform, except when serving with the R.A.F., and in that case they are given an outfit allowance of £25, unless a particular officer has recently held a regular R.A.F. Commission. The Government sends Reserve officers to a civil flying school either for a refresher course or for training *ab initio*. There are five such schools, the De Havilland school at Edgware, the Bristol school, the Armstrong Whitworth school at Coventry, the Blackburn school at Brough near Hull (where seaplane instruction can be given), and the Beardmore school at Renfrew, Glasgow. Training *ab initio* is given at present only at Edgware and Bristol.

The proper form of application can be obtained from the Secretary to the Air Ministry as above.

4. The R.A.F. Special Reserve

This force is the least advanced of all the martial flying organizations. Only one squadron is as yet in process of formation, *viz.*, No. 502 (Ulster) Bombing Squadron, which is located at Aldergrove aerodrome, near Belfast. Its C.O. is Squadron-Leader R. D. Oxland, and its equipment is Vickers Vimy bombers. Candidates for commissions who are resident in Ulster should apply to the Adjutant at Aldergrove.

The Special Reserve trains its officers to fly at the expense of the State and, therefore, in districts where a S.R. squadron is located the attractions which it offers to civilians are about equal with those of the R.A.F. Reserve. In certain other respects the attractions differ, and one man will prefer the Reserve and another the Special Reserve. At present the choice only affects Ulster, but presumably more S.R. squadrons will be formed in course of time. In the S.R. a single-engined bombing squadron is composed of a headquarters and three flights; a twin-engined squadron of a headquarters and two flights. In each the equivalent of one flight and also part of the headquarters is composed of regular personnel, and the C.O. is usually to be a regular officer. The squadrons are raised direct by the Air Ministry and take precedence after the R.A.F. and the R.A.F. Reserve. The uniform is the same as that of the regular R.A.F., and service dress must be provided. Pay is given when serving, and an officer receiving his first commission gets an outfit allowance of £40. The force is intended for home defence only, and owing to the large leaven of regulars, the squadrons should, when an emergency occurs, be able to get into the air almost as quickly as the regular squadrons can do. In situations of grave emergency, when a proclamation calling out the Air Force Reserve has been issued, officers of the Special Reserve can be called upon to serve overseas—a liability which few would wish to shirk.

5. The Auxiliary Air Force

This last, but not least, of the branches of the flying services is on very much the same footing as the Territorial Army, in that the units are raised by the County Associations. The wisdom of instituting both the S.R. and the A.A.F., and so creating confusion by the multitude of organizations, remains to be either vindicated or condemned by results. The Regulations for the Auxiliary Air Force, Air Publication 968, has just been issued, and is reviewed elsewhere. The following résumé may be of help to enquirers.

The Auxiliary squadrons are intended to appeal as widely as may be to the civil population, to popularise flying, and at the same time to provide a section of air defence at the least possible cost to the tax-payer. About 25 per cent. of the personnel in a squadron will be regulars, including the Adjutant and the stores officer. The C.O. and the other officers will be auxiliaries. Applications for commissions must be made on Form 1442 and forwarded, together with a copy of the candidate's birth certificate, to the C.O. of the squadron, either direct or through the County Association concerned. The minimum age for appointment as pilot officer or flying officer is 18 and the maximum is 25. After the application has been sent in, the next thing that happens is a personal interview and a thorough medical examination. If the candidate is then approved, the next question is his ability to fly. The A.A.F. does not undertake flying training, as the four preceding categories do. If the candidate possesses a licence, well and good. If not, then he must go away and learn to fly. After he has done so and has been commissioned, he can be refunded the cost of his flying instruction up to a limit of £115. If he fails to get his "ticket," the State has nothing more to do with him. This provision seems to be a stumbling block to many, and may lead not a few into the Reserve or the Special Reserve who might otherwise have chosen the A.A.F. A candidate should reflect, however, that if the medical examination is thorough and the Reid apparatus is used, and he is still approved as a candidate, there should be very little doubt about his ability to learn to fly. He will have to insure himself during instruction, and it does not appear from the regulations that the cost of insurance can be recovered from the State. It is not impossible, however, that if the insurance is included in the receipt from the flying school, which must be produced, it might be passed. We should certainly advice comprehensive receipts to be procured, and we think the Air Ministry would be well advised not to be too inquisitorial when these receipts are presented. Despite the necessity of a candidate having to learn to fly, not at his own cost but at his own risk of failure, the Auxiliary Air Force will probably be a very popular body. Four squadrons are already in process of formation, No. 600, City of London Bombing Squadron ; No. 601, County of London Bombing Squadron ; No. 602, City of Glasgow Bombing Squadron, and No. 603, City of Edinburgh Bombing Squadron. The first two are at present at Northolt, but are to be moved to Hendon ; No. 602 is at Renfrew, and No. 603 at Turnhouse, Midlothian. The formation of another squadron at Birmingham is contemplated during the present year.

The headquarters of the four squadrons are :—

No. 600, City of London (Bombing) Squadron,
Finsbury Barracks, City Road, E.C.1.

No. 601, County of London (Bombing) Squadron,
Elverton Street, Westminster, S.W.1.

No. 602, City of Glasgow (Bombing) Squadron,
Headquarters, 52nd Lowland Divisional Signal
Company, Jardine Street, Glasgow.

No. 603, City of Edinburgh (Bombing) Squadron,
25, Learmouth Terrace,
Learmouth, Edinburgh.

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REGULATIONS FOR CITIZEN AIR FORCES

1. Regulations for Officers and Airmen serving in the Royal Air Force Special Reserve Squadrons. Air Publication 1108. 1st Edition, April, 1925.

2. Regulations for the Auxiliary Air Force and for County Associations. Air Publication 968. 1st Edition, October, 1925

These two volumes of Regulations have just been made public, and many of the regulations are common to the two Forces. For instance, officers of both Forces are at all times subject to the Air Force Act, whereas airmen are only subject to them when being trained or exercised, etc. ; both Forces are open only to persons of pure European descent ; and both are intended only for Home Defence. It would not be astonishing if the "colour bar" regulation aroused protests from India at the next Imperial Conference, seeing that during the war at least three Indians were commissioned as pilots in the R.F.C. and R.A.F., of whom Lieut. I. L. Roy, D.F.C. shot down nine enemy machines and was killed in air combat ; Lieut. Malik Singh (now in the Indian Civil Service) was wounded, and 2nd Lieut. E. S. C. Sen was made a prisoner of war.

The distinction between the two Forces is briefly set forth in another article in this issue. The regulations governing the Special Reserve are the simpler of the two and are set forth in 299 paragraphs, while those governing the Auxiliary Air Force require 605 paragraphs, of which 280 deal with the County Associations. It may be noted that the Special Reserve is not regarded altogether as a separate force, because of the large proportion of Regular officers and airmen which will serve in it ; while the A.A.F., although containing a certain number of regulars, is very much treated as a separate organization. The titles of the two volumes set forth this difference. In peace time an officer of the Special Reserve may be permitted by the Air Council to serve for periods with the Regular R.A.F. In fact, the Special Reserve is an expansion of the R.A.F. and aims at drawing a certain number of civilians into as close touch as possible with the Regular Force. There is nothing on the uniform of an officer or airman of the Special Reserve to indicate that he is not in the Regulars.

The Auxiliary Air Force, on the contrary, is to be a real citizen force with a minimum of Regular assistance or interference. The C.O. will be an Auxiliary officer with a Regular adjutant to help him ; whereas the C.O. of a S.R. squadron will normally be a Regular. The adjutant will be responsible for the pay accounts of the unit, but during annual training the accountant officer, who will be an Auxiliary, will take them over from him. The stores officer will also be a Regular. The medical officer may be a Regular, an Auxiliary, or a civil medical practitioner, and the chaplain will be an Auxiliary.

The maximum ages for appointment are :—Pilot or Flying Officer, 25 ; Flight Lieutenant, 30 ; Squadron Leader, 35 ; Wing Commander, 40. As explained in another article in this issue, candidates must produce an "A" certificate (except in the case of accountant officers, etc.) before receiving a commission, but if that certificate has been taken for the express purpose of joining the A.A.F. the cost of tuition will be refunded up to a limit of £115 on the production of a receipt from the flying-school. The regulations do not provide for a refund of insurance premia during instruction, and this seems to be an unfortunate omission. If an officer has taken his "ticket" at a light aeroplane club, he may only send in a bill for £15. The club would get a bonus of £10, and the Air Ministry would save £90 of the amount which it is prepared to pay in the matter. In these circumstances, if the candidate produced a receipt in which the cost of actual instruction and also of insurance were lumped together, we think that the Air Ministry would be well advised to pass it without too much inquisitorial examination. It would, nevertheless be much better to alter the regulation, paragraph 393, so as to regularise the payment of insurance during training. One official may interpret regulations broadly, and his successor may be a Shylock.

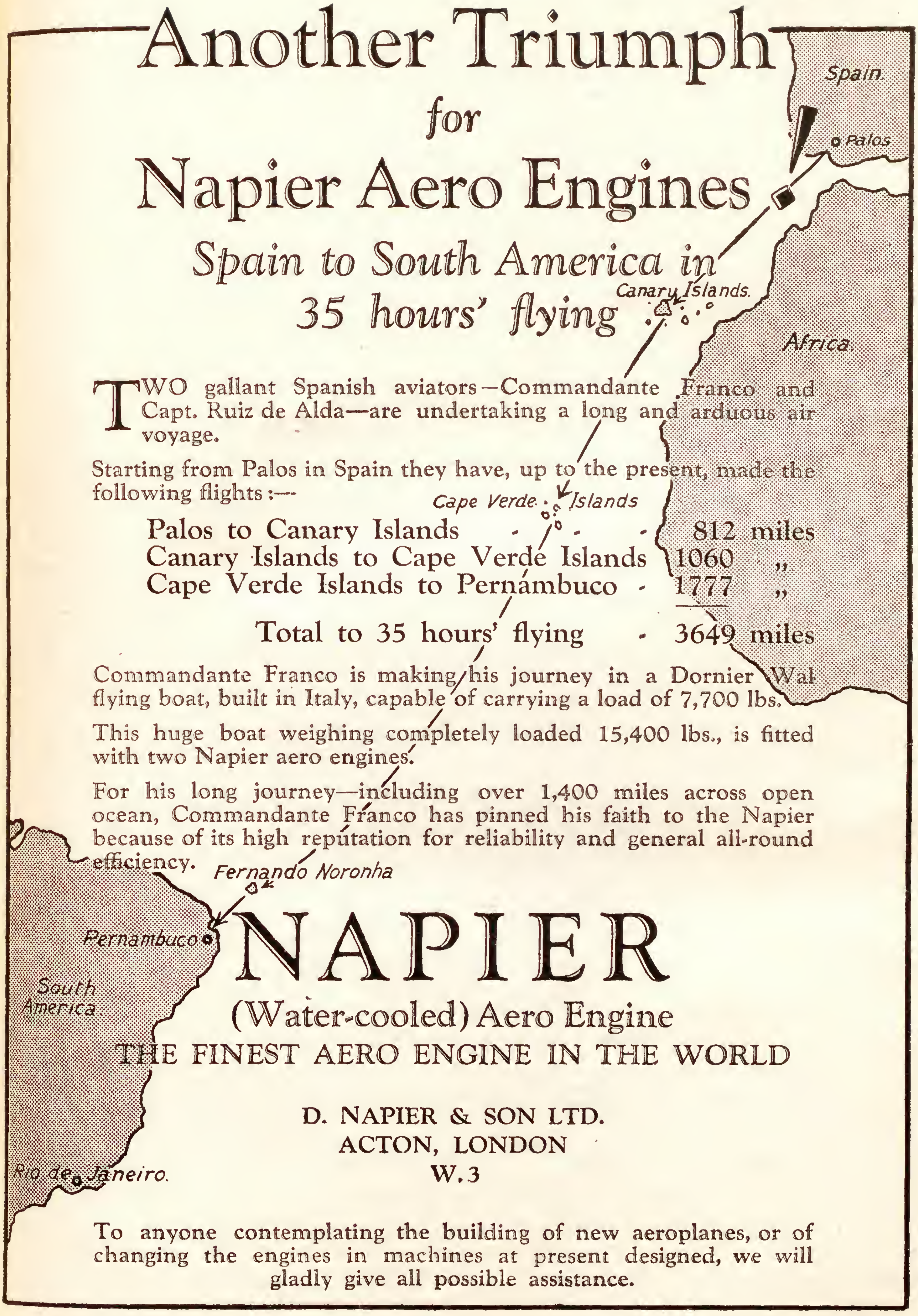
The Auxiliary Air Force is not a direct avenue to a commission in the R.A.F., A.A.F. officers may, however, be selected for Short Service commissions, and the chance of their entering Cranwell is also contemplated. In either case they cease to belong to the A.A.F. It seems unfortunate that specially efficient officers of the A.A.F., and also of the S.R., cannot by any means be transferred into the regular R.A.F. The army has owed much to officers who have obtained their regular commissions through the Militia, and the Air Ministry would, we consider, have been well advised to leave at least a loophole open for similar acquisitions. When the force is embodied after Royal Proclamation, the Air Council may post or attach an A.A.F. officer to a R.A.F. unit. A former R.A.F. officer may be taken from the A.A.F. for service with the R.A.F. in an emergency.

Among the compensations allowed to those who serve their country in citizen air forces are immunity from jury service and from service as a peace officer or parish officer.

The year's training will consist of periodical drills, including flying, instructional parades, and annual training. All officers of the general duties branch must do a minimum of 12 hours solo flying annually. The adjutant is the flying instructor of an A.A.F. unit. Every officer and airman of the A.A.F. is required to carry out annual training for a period of not less than eight or more than 15 days. A longer period is of course encouraged, but not obligatory.

Officers must provide themselves with service dress, which is distinguished from that of the regular R.A.F. by the letter "A" in gilt metal on the lapel of the jacket and on the shoulder straps of the greatcoat. The provision of full dress and mess dress is optional. Officers who retire or relinquish their commissions with leave to wear uniform will use "A.R." instead of "A." Flying kit is issued free, but remains the property of the State. The A.A.F. takes precedence after the Special Reserve.

Pay and allowances will be drawn by officers and airmen for days of actual attendance at annual training, at obligatory courses, when serving on a courtmartial, when specially called up for duty, for days of actual attendance at voluntary courses of instruction if approved by the Air Ministry, and for days (not more than 12 p.a.) of periodical flying duty, but not for instructional parades, etc. Officers, however, are regarded, for allowance purposes, as unmarried. An airman can draw bounties up to £3 p.a. for attending drills in excess of the minimum. A really smart man may earn the recruit's bounty of £2 10*s*., and also the airman's bounty in the same year. Bounties are also paid to officers and airmen



Another Triumph
for
Napier Aero Engines

Spain to South America in 35 hours' flying

TWO gallant Spanish aviators—Commandante Franco and Capt. Ruiz de Alda—are undertaking a long and arduous air voyage.

Starting from Palos in Spain they have, up to the present, made the following flights:—

Palos to Canary Islands	812 miles
Canary Islands to Cape Verde Islands	1060 „
Cape Verde Islands to Pernambuco	1777 „
Total to 35 hours' flying	3649 miles

Commandante Franco is making his journey in a Dornier Wal flying boat, built in Italy, capable of carrying a load of 7,700 lbs.

This huge boat weighing completely loaded 15,400 lbs., is fitted with two Napier aero engines.

For his long journey—including over 1,400 miles across open ocean, Commandante Franco has pinned his faith to the Napier because of its high reputation for reliability and general all-round efficiency.

NAPIER
(Water-cooled) Aero Engine
THE FINEST AERO ENGINE IN THE WORLD

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To anyone contemplating the building of new aeroplanes, or of changing the engines in machines at present designed, we will gladly give all possible assistance.

ARMSTRONG SIDDELEY

The Air-cooled "JAGUAR"

is the most successful engine in the world. Lengthy experience proves that there are fewer involuntary stops with

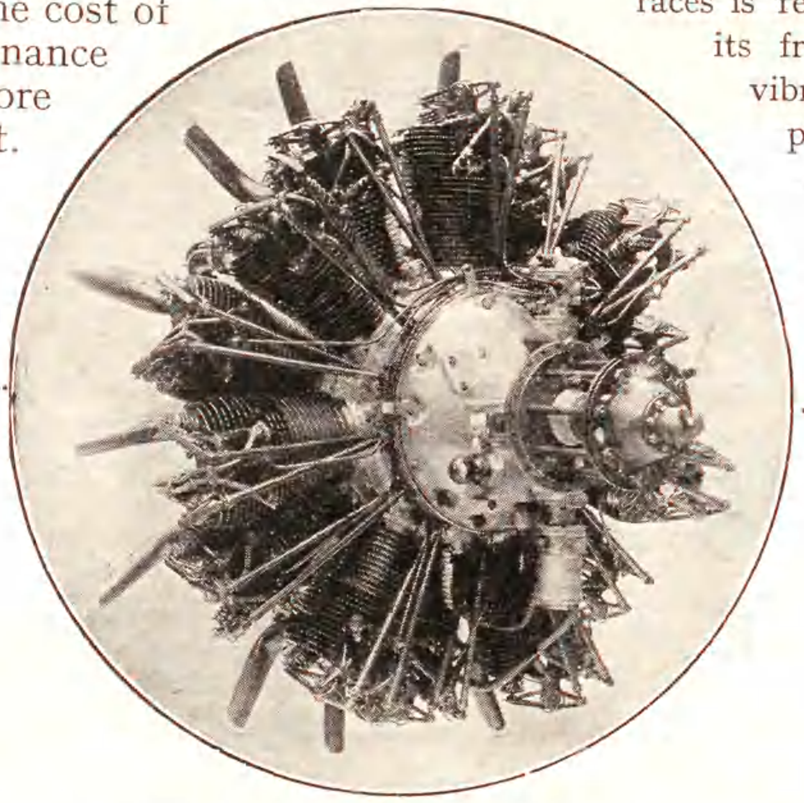
THE "JAGUAR"

than with any other engine. The cost of its maintenance is therefore the lowest.

is the only post-war engine that has figured successfully in the last three King's Cup Races.

THE "JAGUAR"

which made fastest time in the 1923, 1924 and 1925 races is remarkable for its freedom from vibration and low petrol and oil consumption.



The "JAGUAR"

is perfectly cooled under the worst conditions. Alan Cobham, writing in the "Daily Mail," of his London to Cape Town Flight, says:—"We experienced terrific heat in the middle of the day, especially when flying low to photograph the Dam......... The Siddeley Jaguar Air-cooled Engine did not overheat but ran perfectly."

The LYNX is half the JAGUAR and possesses the same high qualities.

ARMSTRONG SIDDELEY MOTORS LIMITED
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Sir W. G.

ARMSTRONG WHITWORTH AIRCRAFT LIMITED

have had the honour of supplying High Performance Steel Aeroplanes to the Royal Air Force for the last three years and are

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The BLACKBURN AEROPLANE & MOTOR CO. LTD.
Olympia, Leeds, England. 'Grams: Propellers Leeds'

(excluding regular officers) of the best A.A.F. squadron of the year. An officer on joining, who has not held a commission under the Air Ministry or has not been granted one since August 1, 1919, receives an outfit grant of £40, and when a previous grant has been received a proportionate grant may be made.

The terms of service on the whole are not unlike those of the Territorial Army, and as that has been a success, there is no reason why the A.A.F. should not be a success also. There is no obligation to be found in the regulations, except that of insurance while learning to fly, which could in any way deter a patriotic young man from joining the force.

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VACANCIES FOR AIRCRAFT APPRENTICES (R.A.F.)

The Air Ministry announces that five hundred aircraft apprentices, between the ages of 15 and 16½ (extended in certain cases to 17 years) are required by the Royal Air Force for entry into the School of Technical Training, Halton, Bucks. They will be enlisted as the result of an open competition, and of a limited competition held by the Civil Service Commissioners and the Air Ministry respectively. Successful candidates will be required to complete a period of 12 years' service from the age of 18, in addition to the training period. At the age of 30 they may return to civil life or may be allowed to re-engage to complete time for pension.

Full information regarding the apprentice scheme, which offers a good opening to well-educated boys of obtaining a three years' apprentice course of a high standard and of following an interesting technical career, can be obtained on application to the Royal Air Force (Apprentice Department), 4, Henrietta Street, W.C.2.

Approximately 2,500 aircraft apprentices have already completed their training at the technical schools of the Air Force, and the annual output is now in the neighbourhood of 1,000 fully trained aircraftsmen.

The *Open* Competition, for which a fee of 5*s*. is charged, is, as its name indicates, open generally to boys within the age limits who forward completed application forms to the Secretary, Civil Service Commission, Burlington Gardens, W.1, not later than *March* 4. The sons of officers and senior N.C.O.'s of the three services who wish to enter as aircraft apprentices receive special consideration. In their case applications for nomination should be made to the Secretary, Air Ministry, London, W.C.2, not later than *February* 15.

All candidates for the *Limited* Competition must receive a nomination before they can attend this examination. These nominations must be received by the Air Ministry from the nominating authorities not later than May 4. If they are still at school, candidates should apply to their headmaster with a view to obtaining a nomination from the local education Authorities; if they have left school, application can be made to the Advisory Committee for juvenile employment in their area. There is no fee for this examination which is carried out at local centres in each area where boys are nominated.

The principal trades open to boys are carpenter-rigger, aero engine fitter and wireless operator mechanic. The apprentices are given a thorough training in their trade by highly qualified technical instructors and their general education is also carried on simultaneously by civilian schoolmasters.

During the training period the rate of pay is 7*s*. a week for the first two years and 10*s*. 6*d*. a week thereafter, until the apprentice has completed his training. Normally he is then posted to a unit for duty as an aircraftman, the rate of pay varying from 3*s*. 3*d*. to 5*s*. 6*d*. per day according to the success attained in the passing-out examination. In addition a few of special promise proceed to the Royal Air Force Cadet College for training as commissioned officers.

For the remainder opportunities arise later to volunteer to qualify in flying and become sergeant pilots.

◆ ◆ ◆ ◆

Awards of Flight Cadetships to Aircraft Apprentices and of "Sir Charles Wakefield" Scholarship

The Air Ministry announces:—Aircraft Apprentices E. White, J. E. Allen, J. E. MacCallum, N. A. Tait, R. C. Field, and G. H. H. Procter, from No. 1 School of Technical Training (Apprentices), Halton, have been selected for cadetships at the Royal Air Force Cadet College, Cranwell, on the results of the examinations held on completion of their three years' training as aircraft apprentices.

A "Sir Charles Wakefield" Scholarship, valued at £75, has been awarded to Flight-Cadet E. White.

The New Imperial Airways Agreement

We publish below Sir Samuel Hoare's explanatory statement regarding a new agreement made between the Air Council and Imperial Airways, Ltd., supplementing the one concluded on May 15, 1924.

The new agreement modifies the original agreement by substituting for the minimum annual mileage of one million miles required to qualify for the subsidy a new composite minimum of 425,000,000 "horse-power miles," and also by providing that for the purpose of reckoning this minimum every mile performed by a marine aircraft shall count as a mile and a half. The agreement stipulates that the new minimum requirement shall be met in each year, without any such arrangement as that contained in the original agreement for averaging mileage in the earlier years.

The effect of these modifications should be to encourage the employment of more highly-powered machines and consequently to enable the company to develop towards a self-supporting basis as the subsidy decreases. The original mileage requirement was found in practice to put a premium on the employment of the small machine, the mileage of which counted the same for subsidy as that of a more powerful unit, whereas a more promising line of development, if civil air transport is to become economical and efficient, is in the direction of the use of the large high-powered machine.

The alteration as regards marine aircraft is due to the fact that the types hitherto used have been found to have so high a cost of operation in relation to their paying load that there has been insufficient inducement to develop oversea services. It is considered important to prevent such development from falling into abeyance; oversea air services, besides being necessary as links on routes which it is hoped to establish, may also prove eventually to have some positive advantages in operation as compared with overland services.

The amount of the subsidy and the general provisions of the original agreement remain unaltered, but the opportunity has been taken to make one or two small formal alterations in its provisions.

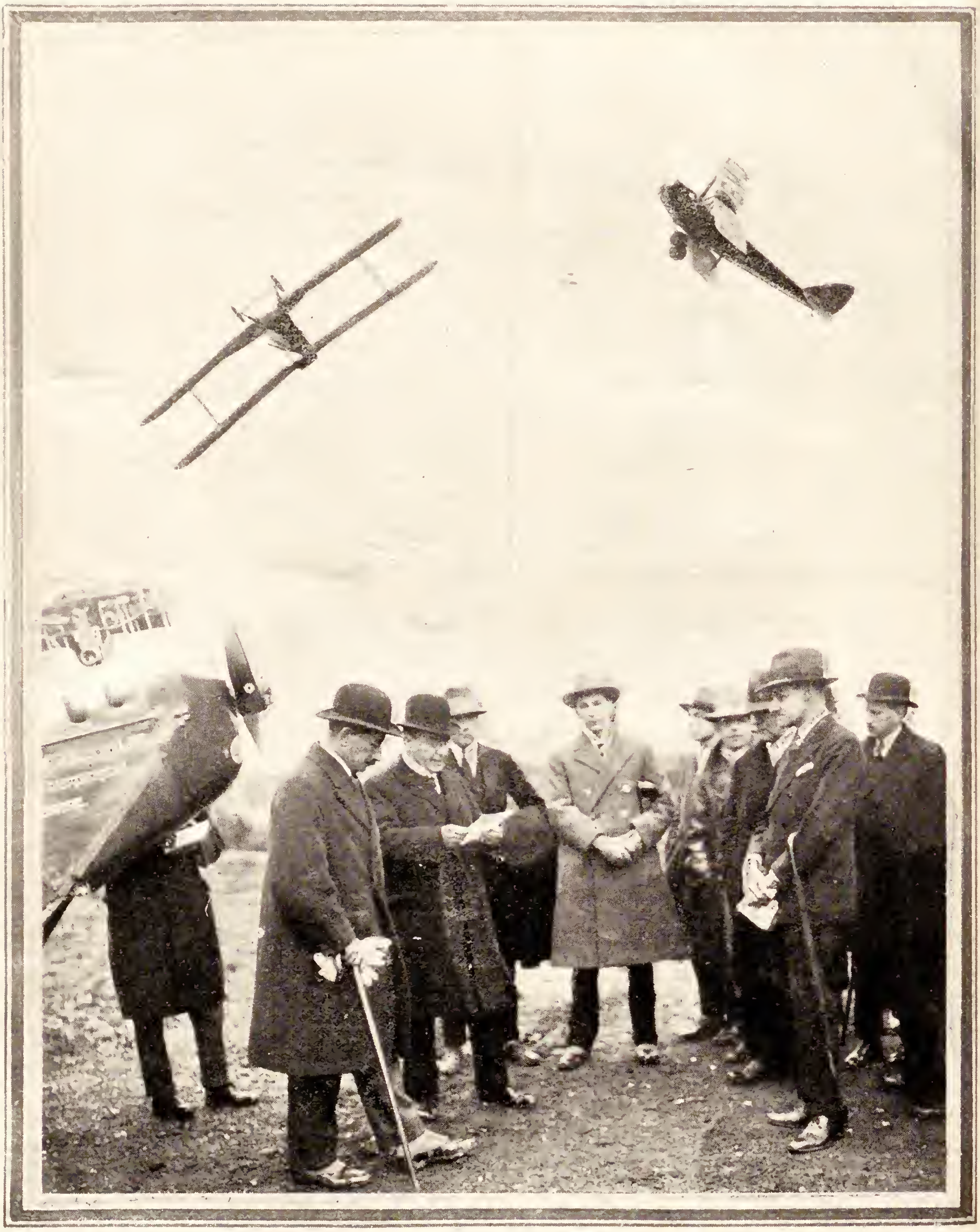
Last Year's Traffic by Junkers Air Lines

Some interesting statistics have been issued concerning the air traffic operated by the Junkers Air Traffic Co. (now amalgamated in the new Deutsche Lufthansa). From January to the end of November, 1925, the company carried in 30,000 flights 80,000 passengers, 370 tons of freight and 250 tons of mail. During this time 2,812,500 miles were flown. Although the final statistics for these services are not yet to hand, one sees already that the Junkers work will have more than doubled that of last year, not only through the lengthening of the routes, but also through the introduction of the triple-screw machines, which have shown themselves to be very efficient. A fact of great interest is that during all this time the statistics of accidents show only one death, one seriously injured and five slightly injured passengers. A matter of special interest is the introduction by Junkers of night flying over the Baltic sea for seven months. In the first month the route Berlin-Stockholm was flown, but later it was extended to Copenhagen. In the last four months this route of Junkers has been run with 100 per cent. regularity, an achievement which has not yet been obtained before in the history of civil aviation. An idea of the enormous increase in air traffic during recent years may be obtained by a glance at the accompanying figures. The following numbers of passengers have been carried: In 1921, 2,230; 1922, 11,005; 1923, 26,509; 1924, 40,298; and in 1925, 93,242. From this it will be seen that the number of passengers carried in 1924 and 1925 respectively is greater than the sum of the passengers carried during the three preceding years. Flying on their routes last year during the months of service, the Junkers all-metal aeroplanes covered 17,500 miles daily.

An Autogyro Mishap

During a series of successful demonstration flights by Capt. F. Courtney with the Autogyro at Villacoublay on January 27, a mishap occurred which caused some damage to the machine. Courtney had just landed, when one of the wheels stuck in the mud, canting the machine sideways—then a strong gust of wind came and blew the machine completely over. Courtney was uninjured, and made some further demonstrations on February 2.

SIR CHARLES' GIFT.



At Stag Lane Aerodrome on Tuesday of this week, Sir Charles Wakefield, Bart., presented to representatives of the Lancashire Aero Club the de Havilland "Moth" generously promised the Club at a luncheon in Manchester in November last. In our group will be recognised Colonel Edwards of the Air Ministry, Sir Charles Wakefield, Commander H. Perrin, Mr. John Leeming, Chairman of the Lancashire Club, and Colonel Darby, whose firm built the "Cirrus" engine with which the "Moth" is equipped. The flying pictures show the "Moth" being stunted by Capt. Broad, the well-known de Havilland pilot.

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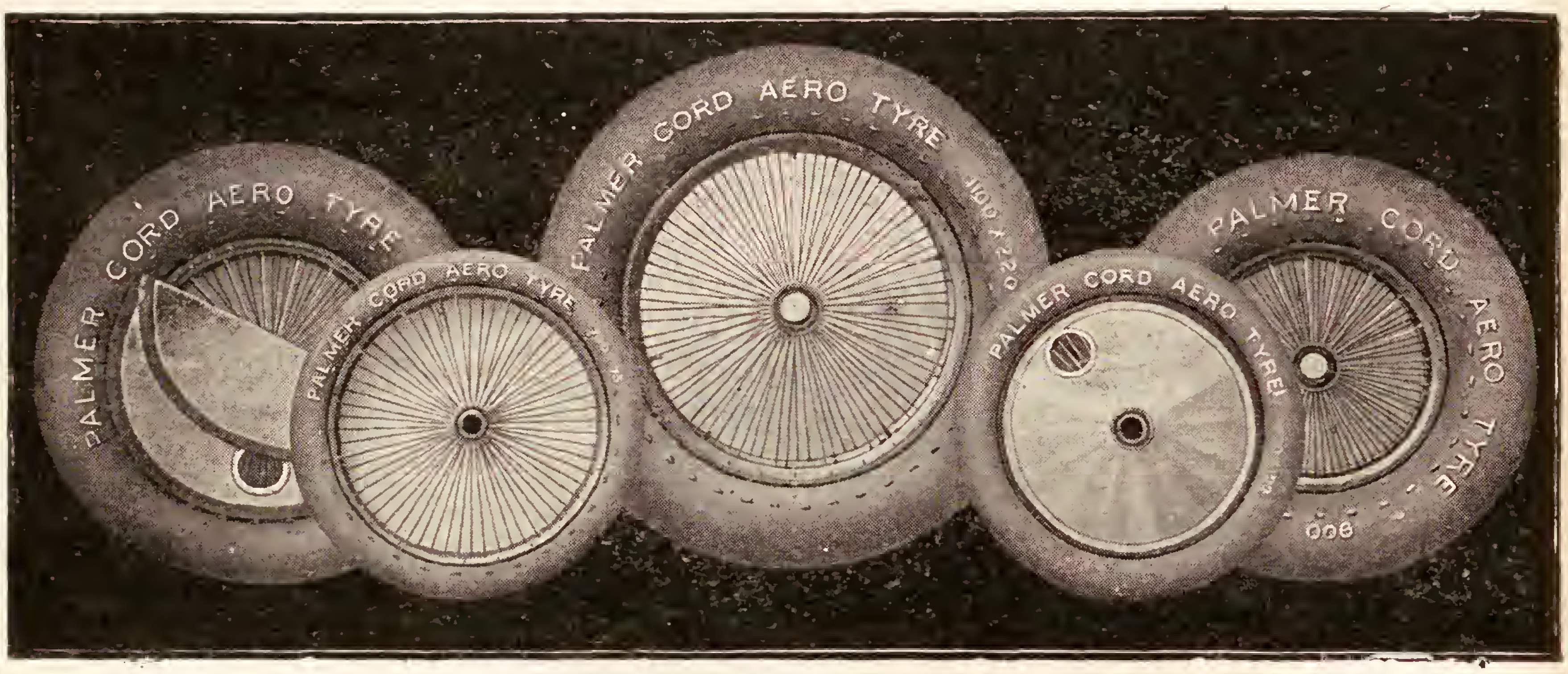

STANDARD SIZES:

Tyre Size	Wheel No.	Hub		Track Line
		Length	Bore	
		m/m	m/m	m/m
375 × 55	168	111.12	25.4	Central
300 × 60	16	111.12	25.4	Central
450 × 60	30	89.	31.75	Central
„	172	130.	38.09	Central
575 × 60	21	160.	28.	Central
„	186	120.	34.92	Central
„	190	150.	38.09	Central
650 × 65	78	178.	44.45	132/46
„	79	178.	44.45	Central
„	100	178.	38.09	132/46
„	101	178.	31.75	132/46
600 × 75	21	160.	28.	Central
„	186	120.	34.92	Central
„	190	150.	38.09	Central
700 × 75	78	178.	44.45	132/46
„	79	178.	44.45	Central
„	100	178.	38.09	132/46
„	101	178.	31.75	132/46
700 × 100	77	178.	44.45	132/46
„	92	185.	55.	135/50
„	95	185.	55.	Central
„	99	178.	38.89	132/46
700 × 100	112	150.	38.09	Central
„	176	178.	44.45	Central
„	179	178.	55.	132/46
650 × 125	119	178.	55.	132/46
„	147	178.	55.	Central
„	188	120.	34.92	Central
750 × 125	77	178.	44.45	132/46
„	92	185.	55.	135/50
„	95	185.	55.	Central
„	99	178.	38.89	132/46
„	112	150.	38.09	Central
„	176	178.	44.45	Central
„	179	178.	55.	132/46
800 × 150	161*	185.	55.	135/50
„	162*	185.	55.	Central
„	163*	185.	66.67	135/50
„	169†	185.	55.	135/50
„	177	185.	55.	135/50
„	183	185.	55.	Central
„	211*	185.	60.32	135/50
1000 × 150	167	185.	55.	125/60
„	174	250.	80.	Central
„	182	185.	55.	Central
1000 × 150	187	220.	66.67	Central
„	201	185.	60.32	125/60
„	210	185.	60.32	Central
1000 × 180	148	220.	80.	Central
„	149	185.	55.	Central
„	155	220	66.67	Central
„	166	185.	55.	125/60
900 × 200	107	185.	55.	Central
„	108	185.	55.	125/60
„	128	220.	66.67	Central
„	137	250.	80.	Central
„	157	185.	80.	Central
„	202	185.	60.32	Central
1100 × 220	134	220.	66.67	Central
„	136	250.	80.	Central
975 × 225	192	185.	60.32	Central
1250 × 250	133	250.	80.	Central
„	154	304.8	101.6	Central
1500 × 300	115	304.8	101.6	Central
„	126	304.8	152.4	Central
1750 × 300	139	400.	152.4	Central
„	191	350.	150.3	Central

* *Wheels Nos.* 161, 162, 163 *and* 211 *are of stronger type than the other wheels for* 800 × 150 *tyres.* † *Wheel No.* 169 *is fitted with Ball Bearings.*
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U/ND   (343)

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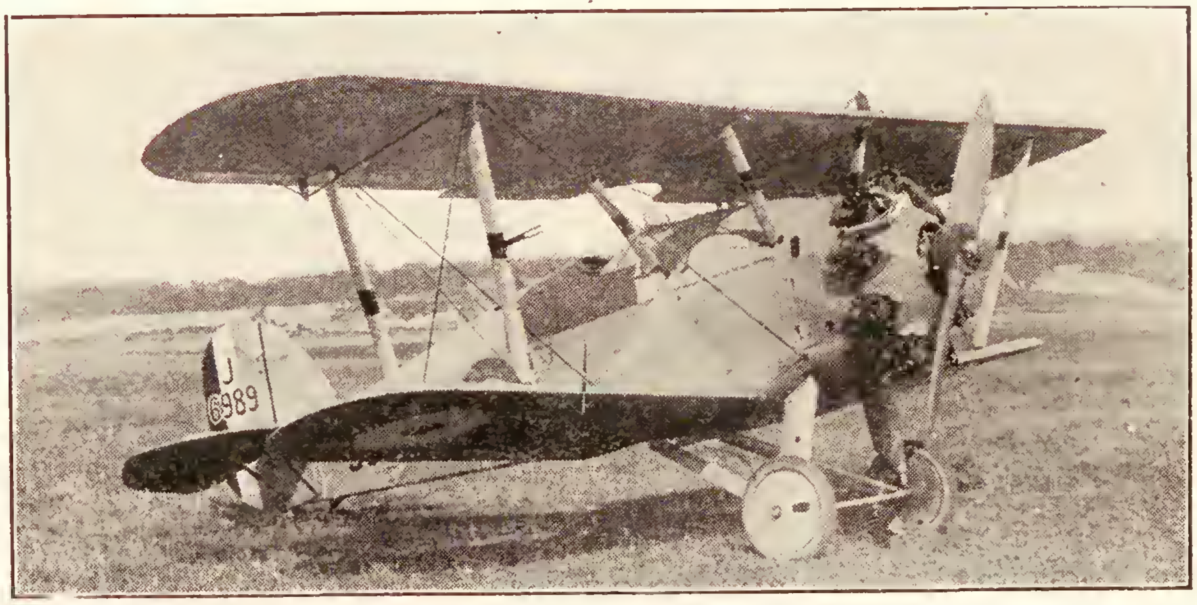

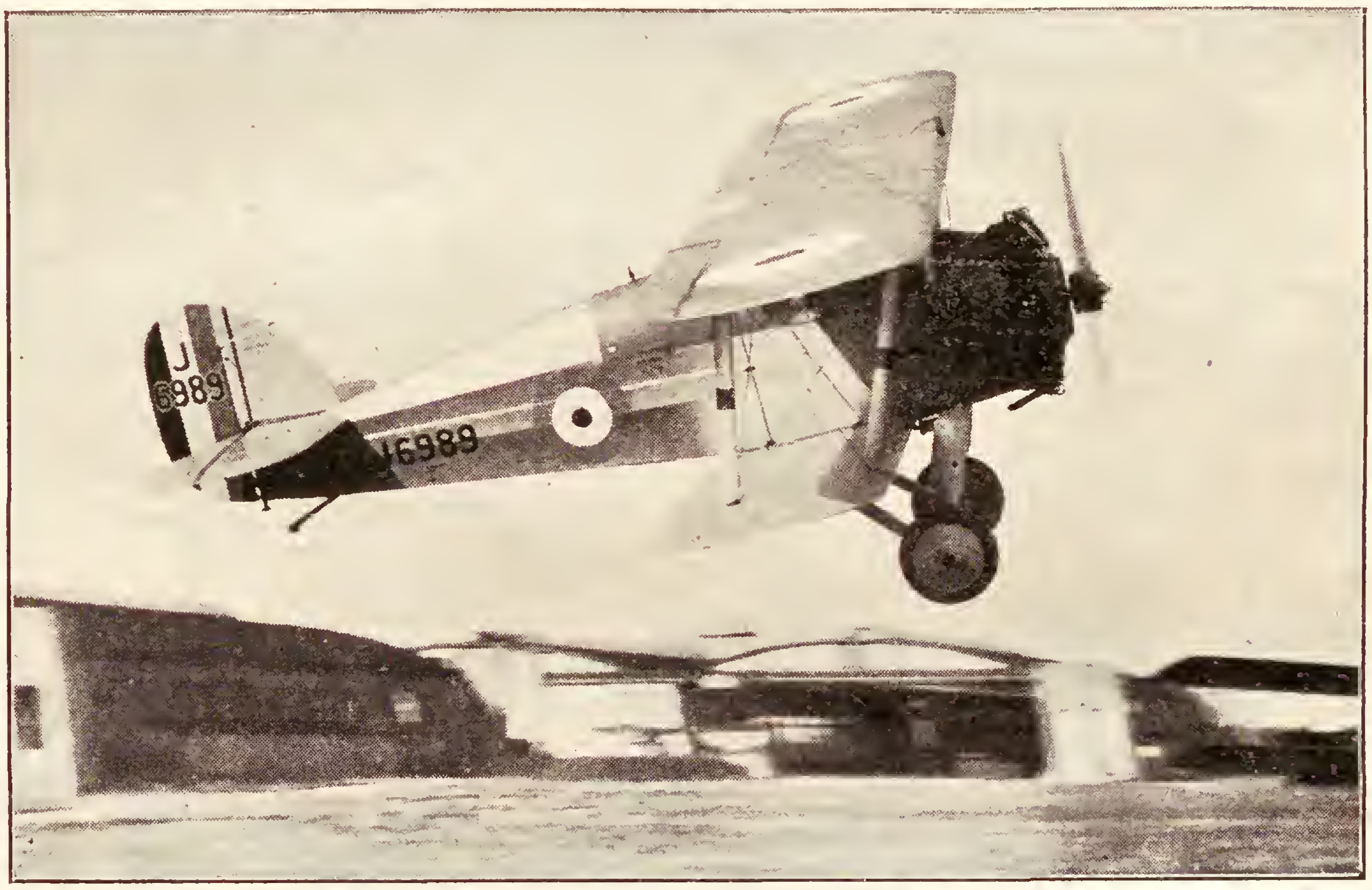

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A REMARKABLE RELIABILITY TEST

In order to establish a public demonstration of the unique reliability, and other qualities, of the Bristol "Jupiter" air-cooled aero engine, the Bristol Aeroplane and Motor Co. have been carrying out a remarkable reliability test during the last few weeks. Since January 4 last a Bristol "Bloodhound" biplane fitted with one of the latest type "Jupiter" engines has been making a series of endurance flights between Filton Aerodrome, Bristol, and Croydon Aerodrome. The engine—which is perfectly standard in every way—has been officially sealed by the Aeronautical Inspection Directorate, who are strictly controlling the test, and no replacements can be made upon the engine without breaking the seals. Three sets of sparking plugs are in use, and have been changed as occasion required.

A REMARKABLE ENDURANCE TEST: The Bristol "Bloodhound," fitted with a Bristol "Jupiter" engine, which has been carrying out a series of endurance flights between Filton (Bristol) and Croydon since January 4. So far it has been in the air for 77 hr. 15 min., and has covered 8,595 miles.

By January 22 the number of hours' running completed was 53 hr. 48 min, and the number of miles flown amounted to 5,970. No engine replacements were made during that time, and the average petrol consumption worked out at 22·5 galls. per hr.

Further flights made in this test, up to the time of writing, are:—Jan. 25: Hours of running completed, 63 hr. 26 min.; number of miles flown, 7,050. Jan. 26: Hours of running completed, 67 hr. 11 min.; number of miles flown, 7,467. Jan. 28: Hours of running completed, 73 hr. 4 min.; number of miles flown, 8,133 (equal to the distance from London to Perth, Australia). Jan. 29: Hours of running completed, 77 hr. 15 min.; number of miles flown, 8,595.

Jan. 30: Hours of running completed, 81; number of miles flown, 9,008 (equivalent to more than five times the distance from Cape Verde Islands to Pernambuco, recently flown by the Spanish airmen).

So far no engine replacements have been made, and throughout the tests the average petrol consumption has not exceeded 22·5 galls. per hr.

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Personals.

Married

The marriage of Brigadier-General C. F. Murphy, late R. Berks Regt. and R.A.F., son of the late Jerome Murphy and of Mrs. Murphy, Killurah-Glen, Castletown Roche, Co. Cork, and Marguerite Marie Nagle, eldest daughter of Mr. and Mrs. Garrett Nagle, of Byblox, Doneraile, Co. Cork, took place at Doneraile on January 20.

To be Married

The engagement is announced between John Beverley Townend, R.A.F., eldest son of Mr. and Mrs. William Townend, of Wakefield and Harrogate, and Phyllis Romana, elder daughter of the late Arthur Cade Bemrose and Mrs. Bemrose, of 26, Oakwood Court, Kensington, and Solentia, Yarmouth, Isle of Wight.

A marriage has been arranged between Air Commodore Felton Vesey Holt, C.M.G., D.S.O., R.A.F., third son of the late Sir Vesey Holt, of Mount Mascal, and of Lady Holt, of 67, Cadogan Place, and Marion Edith, only daughter of Mr. and Mrs. James Henry Dugdale, of Cadogan Gardens S.W., and Rowney Priory, Hertfordshire.

The engagement is announced between Squadron-Leader John Leacroft, M.C., R.A.F., son of the late Dr. and Mrs. J. W. Leacroft, of Derby, and Gladys Underhill Cuddon, youngest daughter of the late Mr. G. U. Cuddon, Madras, India, and Mrs. Cuddon.

The engagement is announced between Flight-Lieut. Francis Logan Luxmoore, D.F.C., R.A.F., younger son of the late Mr. and Mrs. Edward Luxmoore, of Weybridge, and Dorothy Jane, daughter of Mrs. E. Johnston, of Nether Denton, Low Row, Cumberland.

The engagement is announced between Captain S. R. Proctor, late R.F.C., youngest son of the Rev. F. B. Proctor, M.A., and the late Mrs. Proctor, of The Manor House, Sutton-on-Trent, Notts, and Madeleine, only daughter of the late Mr. P. Warnford-Davis, J.P., and Mrs. Warnford Davis, of Prince Edward Mansions, Palace Court, W.

The engagement is announced between Athol G. Stratford Tuke, R.A.F., son of Col. G. F. Stratford Tuke, D.S.O., R.A., and Mrs. Tuke, and Jocelyn, daughter of Mr. and Mrs. J. C. Sparks, of Heytesbury, Wilts.

The wedding of Captain J. B. Walmsley, D.F.C., barrister-at-law, and Miss Dorothy Bleasdale will take place at Mossley Hill Church, Liverpool, at a quarter to two o'clock on February 9.

The marriage of Flying Officer Ralph Woodcock Gifford, Lywood, son of Col. Lywood, of Alverstoke, to Miss Margaret Smith, younger daughter of Mr. and Mrs. F. J. Smith, of Alverstoke, will take place at All Souls' Church, Langham Place, on February 16.

Death

Wing-Commander T. O. Lyons, O.B.E., R.A.F., died on February 1, at No. 4 Stores Depot, R.A.F., Ickenham, from after-effects of service in the Great War and Iraq later.

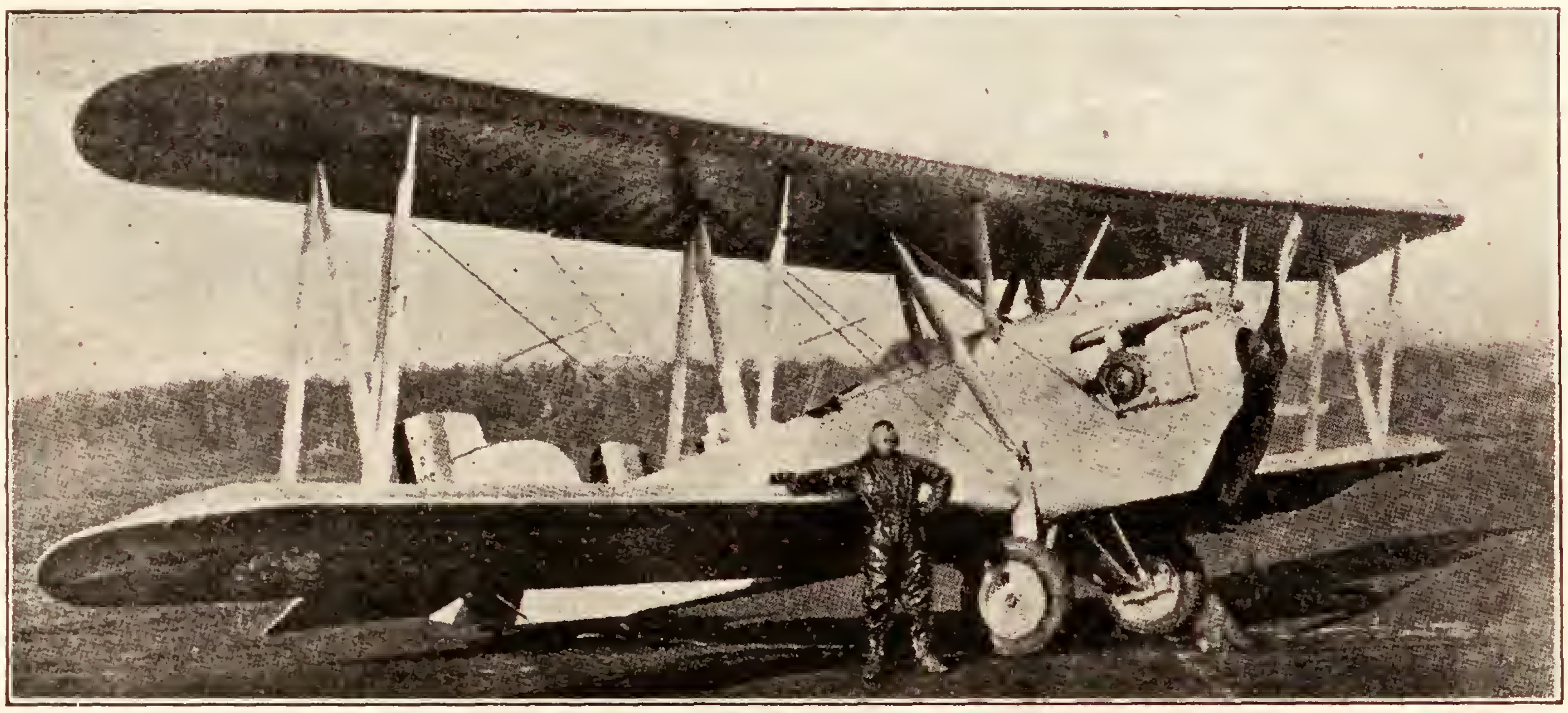
Item

The Right Hon. Sir Samuel Hoare, Minister for Air, and Lady Maud Hoare returned to their residence in Cadogan Gardens on February 1, from Switzerland.

A FINE AMERICAN ALTITUDE FLIGHT

On January 29 last Lieut. John A. Macready, the well-known American pilot, made a magnificent attempt to beat the world's altitude record of 39,596 ft., established by the French pilot Callizo. At first it seemed as if he would be successful in achieving his object, but, when at an altitude of 35,900 ft.—where Macready reported a temperature of 50 deg. below zero—the supercharger, which was fitted on his machine, developed trouble, and he was forced to descend. On landing, Macready appeared to be little the worse for his experience.

He was using a special altitude 'plane, known as the XCO5, which we illustrate herewith. We publish also some notes on this machine, by A. M. Jacobs, from the "U.S. Army Air Service News Letter," which, we think, may be of interest.



[U.S. Air Service Photo

MACREADY'S ALTITUDE 'PLANE: The XCO5A (400 h.p. "Liberty"), developed by the U.S. Engineering Division, McCook Field on which Lieut. John A. Macready (standing by machine) attained an altitude of nearly 36,000 ft. last week.

The P-53, Le Pere biplane, twice in tests of altitude equipment taken to heights which secured for the United States world altitude records, having well served its purpose, is about to be retired in favour of a more modern design. Its successor, the XCO5, designed and built by the Engineering Division in 1923, is at present undergoing remodelling with the expectation of being ready for the testing of altitude equipment in the near future. In looking about for a plane which, would most efficiently fulfil the conditions for altitude work several features governed. It had been decided that the new choice must be designed for a supercharger, must be lighter per wing-span ratio than the old Le Pere and adapted to being fitted with high lift wings and a propeller of large diameter. The XCO5, more than any other plane, seemed to answer this description and to more generally lend itself to the modifications which would be necessary.

Of first importance, were the wings. The type selected to give the high lift desired was the Joukowsky StAe-27A. A set of wings to this design was built in the Engineering Division shops. Of wood and fabric construction, they are heavily cambered, being extremely thick at the leading edge and tapering sharply to the rear. Gap and stagger are pronounced. They present a total area of 600 sq. ft., with an aspect ratio of 10. Mounted on the fuselage on the XCO5, they reduce the weight-span ratio to a much lower value than the plane's original wings. With these wings it is planned to use a detachable-blade aluminium alloy propeller, 10 ft. 6 in. in length with pitch adjustable on the ground.

The inside of the fuselage of the plane has also undergone considerable remodelling in preparation for the frigid journeys.

The liquid oxygen flasks, in former flights placed in the rear cockpit, have been moved to the rear of the rear cockpit with tubes and regulators carried through to the front cockpit. In the one-man altitude tests, the rear cockpit will carry the recording barographs and thermographs and be sealed over. The pilot's cockpit has been completely lined, the floor and lower half of the walls with plywood, the upper half with quilted felt corduroy which, coming around the back of the pilot's seat, forms a taut cockpit covering which fastens about the pilot's neck and extends to the cowling. Even the opening about the socket of the control stick is closed over with corduroy, the whole interior being made snug against the entrance of outside winds or draughts. Through the cowling, which is of transparent celluloid, the pilot looks down upon the instruments and controls, with each of which, some time during the flight, his eyes or hands must be busy. There he sees the altimeter, the tachometer, the air speed indicator, the variable engine pressure gauge, which indicates the difference of air pressure in the carburettor as altitude is gained, the fuel level gauge, the fuel pressure gauge, the water thermometer for water leaving the engine, the water thermometer for water leaving the radiator, the oil-pressure gauge, the thermometer for oil entering the engine, the thermometer for oil leaving the engine, the clock, the oxygen flow regulator, the Liberty engine ignition switch, the battery control switch—the plane is equipped with a dual set of batteries so that, if one runs down, the pilot can switch to the second—the emergency gasoline hand pump, the radiator shutter control, the throttle control, the spark control, the carburettor mixture control, the supercharger blast gate control, the gasoline shut-off valve and, last but not least, the airplane stick and rudder controls. In addition, will be mounted a thermometer to give the air temperature inside the cockpit and a second altimeter registering the altitude according to the Federation Aeronautique Internationale reckoning.

In former flights, a temperature as low as 82½ degrees below zero, Fahrenheit, had been encountered. To further protect the pilot from the extreme cold, an extra heating apparatus has been mounted on the exhaust manifold on the left side of the plane so that the cold air passing over the hot manifold and becoming heated, is led through a tunnel and thence into a flexible conduit which, extending into the interior of the cockpit, ends near the control stick. In this way, the warm air will be directed to the pilot's hands and the centre part of his body, though because the conduit is flexible, he may change that direction as he chooses. Dampers in the tunnel make it possible to keep the temperature from becoming too warm at the lower altitudes, a danger which, of course, will not exist higher up.

The XCO5 is powered with the 400 h.p. Liberty engine. A submerged fuel system has been adopted for altitude work; that is, the fuel pump has been placed at a level lower than the gasoline tank, thus accomplishing gravity feed from tank to pump. At high altitudes, the boiling point of fuel is reduced close to its vaporization point. Therefore, any added negative pressure imposed on the fuel by its lifting to the pump, is apt to cause vaporization, in which condition it is impossible to pump it to the engine. By submerging the pump beneath the level of the tanks, the duty of the pump is reduced to merely discharging the fuel, which, backed by an even gravity pressure, more easily retains its normal liquid

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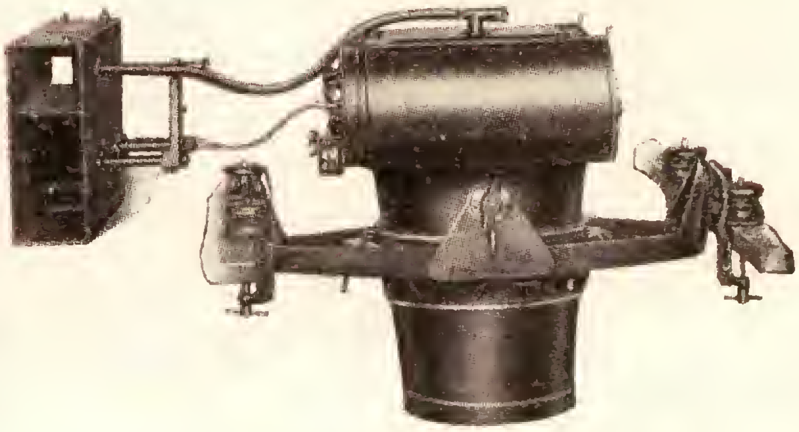

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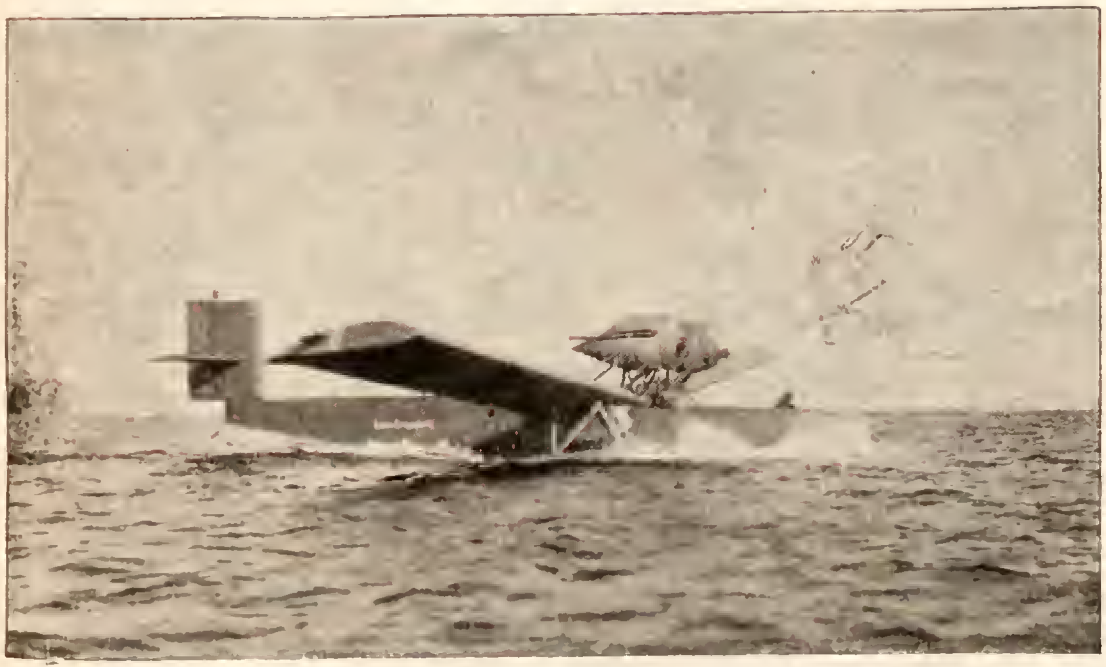

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Another Record!

THE wonderful flight from Palos Mogner, Spain, to Pernambuco, Brazil, adds one more record to the already long list of notable achievements obtained by machines fitted with

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COMMANDANTE Franco and Captain Ruiz de Alda achieved this flight, a distance of 3,150 miles, in 32 hours, on a Dornier-Wal air-boat equipped with Napier "Lion" Engines.

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Mr. Alan Cobham's remarkable flight from Croydon to Zurich and back in 14 hours with a D.H. "Moth."
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condition. The regular Liberty starting system has been removed and an 8-volt ignition system installed to lighten the plane for these tests.

Since the Liberty engine, which delivers 400 h.p. at sea level, has an output of but 50 h.p. at 35,000 ft. unsupercharged, a supercharger is a prime requisite of altitude work. The General Electric Form F, 20,000-ft. side type supercharger used in previous tests, with certain modifications, has been installed. The supercharger is an air compressor which keeps the air pressure in the carburettor at sea level pressure at heights where, owing to the natural decrease in the air pressure, the horsepower gradually falls away to but a fraction of its original output. In former supercharger installations, much difficulty was experienced with pre-ignition of the engine. This often became so pronounced that the plane had to be brought to earth. It was suspected that a richer mixture with supercharger at altitude was necessary. This was found to be true but the principal difficulty was the overheating of the mixture due to the heat generated in the supercharger itself. Due to the increase of temperature created by the compression in the supercharger, it was necessary to interpose an intercooler between the supercharger outlet and the carburettor in order to obtain satisfactory engine performance. The intercooler, in the form of a honeycomb radiator, was placed on the side of the aeroplane. It was also found that, due to poor conductivity of the air at high altitudes, additional radiating surface for engine cooling was required. This, with the correction of mixture, put an end to pre-ignition.

Though much has been accomplished in the refinement of plane and engine for altitude purposes in the last several years aside from improvement of oxygen equipment, little has been done toward enabling man to increase his own ceiling or towards gaining normal efficiency for his body in the altitudes which he has already succeeded in reaching. A seemingly almost insurmountable difficulty lies in the task of making up to the human body for the decrease in air pressure and the limited amount of oxygen his lungs are capable of consuming at such heights. The cold, though a severe drain on the system with the best protection possible, is more easily met. To prepare for it, Lieutenant Macready wears over his uniform, a heavy suit of woollen underwear and over that a thick heavily padded, leather-covered suit of down and feathers.

Then, fur-lined gloves, fleece-lined mocassins, over the boots and a leather head mask lined with fur, which, with the oxygen mask, completely covers the face, completes the costume. The goggles are coated on the inside with anti-freezing gelatine supposed to function to 60 degrees below zero. Fahrenheit.

Of course, electrically-heated suits are not practical for such flights, for they mean but another system of wires and switches for the aviator to add to his already complicated list of mechanisms and controls and should anything go wrong with the wiring, the suffering from the cold would be too intense to permit of continuation of the experiment, even if it did not, in conjunction with the other adverse conditions, cause unconsciousness.

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THE ROYAL AIR FORCE

London Gazette, January 26, 1926

General Duties Branch

The following are granted permanent commns. as Flight-Lieutenants, Jan. 1:—B. C. H. Cross, D.F.C.; R. J. M. De St. Leger; F. H. E. Reeve. The following are granted short service commns. in the ranks stated, with effect from and with seniority of Jan. 16:—Flying Officer (for seven years on the Active List) R. E. H. Horn (Lieut., Indian Army, retd.). Pilot Officers on probation (for five years on the Active List)—C. P. Ashton-Jinks, W. L. Bateman, P. S. Cook, C. H. L. Evans, C. V. Godfrey, F. Gower-Jones, J. A. Grieves, V. G. A. Hatcher, W. A. Hills, V. W. Huggett, C. S. John, H. C. Johnson, C. G. Lucas, D. Mackenzie, A. F. Merritt, D. H. A. C. D. Patton-Bethune, W. M. Phillips, W. J. Pickard, E. G. Searson (Sec. Lieut., R.A., T.A.), L. S. S. Tunks, G. A. Underdown H. J. Walker, W. F. Ward.

Lieut. A. R. Braybrooke, K.S.L.I., is granted a temp. commn. as a Flying Officer on seconding for four years' duty with R.A.F.; Jan. 16. Pilot Officer G. D. Green is promoted to rank of Flying Officer; Aug. 14, 1925. Pilot Officer on probation A. C. Watkins is confirmed in rank; Jan. 18. Flying Officer B. M. T. S. Leete is transferred to the Reserve, Class A; Jan. 28.

The following relinquish their short-service commns. on account of ill-health (Jan. 27):—Flying Officer (hon. Flight-Lieut.) C. W. Dann, M.C. (Capt., Ind. Army, retd.); Pilot Officer on probation C. Taite. The following relinquish their temp. commns. on return to Army duty:—Flying Officer A. W. Henderson (Lieut., R.A.); Jan. 16. Flying Officer T. W. Shortdridge (Lieut. Green Howards); Jan. 19. C. F. L. Holford, Lieut., R.M., Flying Officer, R.A.F.) relinguishes his temp. commn. on return to the R.M.; Jan. 21, 1920.

AUXILIARY AIR FORCE

General Duties Branch

The following to be Squadron-Leader:—No. 602 (City of Glasgow) (Bombing) Squadron.—J. D. Latta, M.C., to command the Squadron; Feb. 1.

Medical Branch

The following to be Flight-Lieutenant:—No. 601 (County of London) (Bombing) Squadron.—J. D. Driberg, O.B.E., M.C., F.R.C.S.; Jan. 26.

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified:—

General Duties Branch

Squadron-Leader W. W. Hart, M.B.E., to H.Q., Coastal Area; 28.1.26.

Flight-Lieutenants: E. L. Ardley, to No. 24 Sqdn., Kenley; 26.1.26. L. F. Pendred, D.F.C., to Central Flying Sch., Upavon; 22.1.26. L. Wanless-O'Gowan, to R.A.F. Depot; 4.2.26. A. M. Blake, A.F.C., to R.A.F. Depot, on transfer to Home Estab.; 15.1.26. A. R. M. Rickards, A.F.C., to R.A.F. Depot, on transfer to Home Estab.; 31.12.25. W. A. B. Savile, to Air Ministry; 4.2.26. A. R. M. Rickards, A.F.C., to R.A.F. Cadet Coll., Cranwell; 1.2.26. J. Bussey, to H.Q., Inland Area: 2.2.26.

Flying Officers: M. E. B. P. Storrie, to No. 208 Sqdn., Egypt; 15.1.26. R. E. H. Horn, to No. 2 Flying Training Sch., Digby, on appointment to a Short Service Commn.; 16.1.26. A. R. Braybrook, to No. 2 Flying Training Sch., Digby, on appointment to a Temp. Commn. on being seconded from the Army; 16.1.26. J. Noonan, D.S.M., to R.A.F. Cadet Coll., Cranwell; 19.1.26. G. Combe, to No. 17 Sqdn., Hawkinge; 3.2.26. E. H. Alliott, to Electrical and Wireless Sch., Flowerdown; 25.1.26. R. Beresford, to Elect. and Wireless Sch., Flowerdown; 25.1.26. E. C. Dearth, to R.A.F. Cadet Coll., Cranwell; 31.1.26. H. M. Groves, to No. 31 Sqdn., India; 15.1.26. C. J. Sims, D.F.C., to Reception Depot, West Drayton; 1.2.26. R. Menzies, to No. 2 Sqdn., Manston; 1.2.26. C. B. McIntyre, to No. 2 Flying Training Sch., Digby; 1.2.26. H. R. McL. Reid, D.F.C., to R.A.F. Cadet Coll., Cranwell; 1.2.26. W. C. P. Bulloek, to H.M.S. *Eagle*; 20.1.26. J. F. Bythell, to Elect. and Wireless Sch., Flowerdown; 27.1.26.

Pilot Officers: J. A. Tindall, to No. 2 Flying Training Sch., Digby, on appointment to a Permanent Commn.; 18.1.26. G. D. Middleton and A. G. Piekering, to No. 481 Flight, Malta; 14.1.26. A. T. S. Studdert, to No. 1 Sqdn., Iraq; 15.1.26. C. P. Ashton-Jinks, W. L. Bateman, P. S. Cook, C. H. L. Evans, C. V. Godfrey, F. Gower-Jones, J. A. Grieves, V. G. A. Hatcher, W. A. Hills. V. W. Huggett, C. S. John, H. C. Johnson, C. G. Lucas, D. Mackenzie, A. F. Merritt, D. H. A. C. D. Patton-Bethune, W. M. Phillips, W. J. Pickard, E. G. Searson, L. S. S. Tunks, G. A. Underdown, H. J. Walker, and W. F. Ward, all posted to No. 2 Flying Training Sch., Digby, on appointment to Short Service Commns. (on probation); 16.1.26. G. E. G. Lywood, to No. 17 Sqdn., Hawkinge; 28.1 26. S. H. C. Grey, to No. 2 Flying Training Sch., on appointment to Short Service Commn. (on probation); 23.1.26. R. H. Donkin, to No. 2 Flying Training Sch., Digby, on appointment to a Short Service Commn. (on probation); 22.1.26. E. D. MacL. Hopkins, to No. 2 Flying Training Sch., Digby, on appointment to a Permanent Commn.; 26.1.26. J. H. C. Purvis, to No. 25 Sqdn., Hawkinge; 27.1.26.

NAVAL APPOINTMENTS

The following appointments have been made by the Admiralty:—

Lieutenants (Flying Officers, R.A.F.): A. A. Murray, to *Eagle* and for 422 Flight; 14.1.26. G. R. M. Robertson, to *Columbine* by R.A.F. Base, Leuchars; 26.1.26.

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ROYAL AERONAUTICAL SOCIETY

(Official Notices)

Endowment Fund.—The recent appeal on behalf of an Endowment Fund by Sir Samuel Hoare and Air Vice-Marshal Sir Sefton Brancker has been generously responded to by Sir Charles Wakefield, who has contributed £250, and by "A Friend of Aviation," who has contributed £100. It is hoped that this magnificent start will be followed up quickly so that the Society can immediately put in hand the schemes for the supplying of information to the new technical grade of Associate, and can also proceed with the very necessary propaganda work through the new branches which are being formed.

In connection with the Endowment Fund it will be remembered that Lord Cowdray has generously offered a sum of £50 a year for five years, if nine others will follow his example.

J. Laurence Pritchard,

Honorary Secretary

CORRESPONDENCE

THE AIRCRAFT ENGINEER.

[2116]. I find that in the article published in The Aircraft Engineer, I omitted to give the references to the Technical Memoranda issued by the Aeronautical Research Committee.

These are—

R. and M., *No.* 916.—Slot Control on an Avro with standard and balanced ailerons. By F. B. Bradfield of the R.A.E.

R. and M. No. 856.—Some Experiments on a Model Biplane having Slotted Wings with Particular Reference to the Control at Low Speeds. By H. B. Irving, B.Sc., and A. S. Batson, B.Sc.

R. and M. No. 968.—Full Scale Test of a New Slot and Aileron Lateral Control. By H. L. Stevens, B.A., of the R.A.E.

F. Handley Page.

Cricklewood, London, N.W.2.
February 2, 1926.

[In connection with the article by Mr. Handley Page in The Aircraft Engineer last week, an error crept in which was not noticed in time to be corrected. In table 3 on p. 3, the last two divisions were headed : " Flap angle, −10°," and " Flap angle, −20°." These should have read : " Flap angle +10° " and " Flap angle, +20°," respectively. In the graph published in the right-hand column, next to table 3, the positive signs were correctly given.—Ed., The Aircraft Engineer.]

* * * *

The Aircraft Engineer

The first issue of our technical supplement, published last week, has met with a most gratifying response from our readers, a large number of whom have written in to express their appreciation. A discussion, in the form of correspondence, of the articles published must be deferred to a later date.

London—Cape Town Survey Flight.

The news of Alan Cobham's London—Cape Town Survey Flight this week is somewhat more lively than it has been hitherto. It is to be hoped that, having now got so far—he has only some 900 miles more before him—Dame Fortune is not going to be unkind. They left Broken Hill on January 29 for Livingstone, 290 miles away, and flew over the famous Victoria Falls en route. A really thrilling incident was experienced when they attempted to obtain some unique films of the falls. This is rendered somewhat difficult owing to the exceptionally heavy clouds of spray sent up from the 400 ft. torrent. Cobham flew along the brink of the falls and awaited an opportunity of the wind blowing the spray clear. At last this occurred and he dived down along the deep ravine and got some good pictures—then the spray shot up again, enveloping and drenching the machine. This evidently caused water to get into the carburettor, for suddenly the engine momentarily stopped. They were naturally in an exceedingly precarious position but fortunately the engine picked up again and Cobham was able to " hoik " the machine out of the ravine and make for a safe landing spot. We trust the resulting pictures will be worth this unpleasant experience. On January 31 they flew 240 miles to Bulawayo, where they received the most enthusiastic reception of the whole tour—except for the one they were given when a landing was effected on the S.A. Air Force aerodrome at Pretoria on the evening of February 2. Here they were greeted by Colonel Sir P. Van Ryneveld, D.S.O., M.C., who flew from England to Cape Town in 1920. For the first time during the whole flight trouble was experienced in getting the machine to take off with full load in the rarefied conditions prevailing along certain parts of the route. This occurred at Bulawayo, and after two unsuccessful attempts to rise—which almost terminated in the same tree which brought Sir Van Ryneveld's machine down—Cobham decided to " throw overboard " Mr. Emmott (cinematographer) and 200 lbs. of fuel, and thus got safely away.

Schneider Cup Entries

It begins to look as if, after all, there may be British challengers for the Schneider Cup Race, which is dated to take place at Norfolk, Virginia, on October 24, 1926. As we briefly recorded last week, Mr. S. E. Saunders has decided to enter for this year's race, and is at present engaged on the design of a challenger. Ever one of our best sportsmen, Mr. " Sammy " Saunders, has repeatedly shown his willingness to help where aviation is concerned, and it has been mainly due to his hospitality that in the Schneider Cup Races held in this country, the competitors were housed in adequate quarters. He has even been known practically to rebuild a damaged foreign competing machine in his shops. It is not, therefore, surprising that Mr. Saunders has come forward when a total absence of British challengers was threatened, and all will wish him the best of luck with his new designs, which are believed to incorporate a number of unorthodox features.

Yet another entry is now reported, this time by Colonel Bristow, at one time of Ogilvie and Partners. Colonel Bristow's entry is rumoured to be a monoplane, but at the moment it is not possible to ascertain anything very definite about it. If Great Britain is to have a sporting chance in the race this year, it is essential that the machines should be finished in good time, and it is highest time that the pilots should be chosen and start training. The sooner, therefore, the whole subject is taken out of the atmosphere of secrecy which at present surrounds it, the better.

* * * *

PUBLICATIONS RECEIVED

The Official Gazette of the United States Patent Office. January 5, 1926. The United States Patent Office, Washington, D.C., U.S.A.

Revue Juridique Internationale de la Locomotion Aerienne. October, November, December, 1925. Per Orbem, 4, Rue Tronchet, Paris.

Onderzoek Naar de Bruikbaarheid van het Hoogtevliegtuig Voor Verkeersdoeleeinden. By B. L. Voskuil. J. Waltman, Junr., Delft, Holland.

Royal Air Force Pocket Book and Diary, 1926. Gale and Polden, Ltd., 2, Amen Corner, London, E.C. Price, bound in cloth in R.A.F. colours, 2*s* ; bound in royal blue leather, 3*s* (postage extra).

A Method of Starting Engines of Light Aeroplanes. Air Publication 1163. *First Edition. June,* 1925. H.M. Stationery Office, Kingsway, London, W.C. 2. Price 2*d.* net.

Regulations for the Royal Air Force Reserve. Air Publication 938 (*Second Edition, November,* 1925). H.M. Stationery Office, Kingsway, London, W.C. 2. Price 4*d.* net.

Regulations for the Auxiliary Air Force and for County Associations. Air Publication 968 (*First Edition, October,* 1925). H.M. Stationery Office, Kingsway, London, W.C. 2. Price 3*s.* 6*d.* net.

A Commercial and Historical Atlas of the World's Airways. Francis J. Field, Ltd., 57-58, New Street, Birmingham. Price 2*s.* 6*d.* net.

Eleventh Annual Report of the National Advisory Committee for Aeronautics, 1925. United States National Advisory Committee for Aeronautics, Washington, D.C., U.S.A.

* * * *

AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations : Cyl. = cylinder ; i.c. = internal combustion : m. = motor. The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

APPLIED FOR IN 1924.

Published February 4, 1926

23,730. Sir W. G. Armstrong, Whitworth and Co., Ltd., and R. Morrison. Sighting-devices for director firing. (245,506.)

24,075. A. H. R. Fedden and Bristol Aeroplane Co., Ltd. Construction of joint comprising members of different thermal expansions. (245,528.)

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1,516. C. R. Fairey. Radiators. (245,600.)

9,221. W. T. Hughes. Shock-absorbing apparatus. (245 645.)

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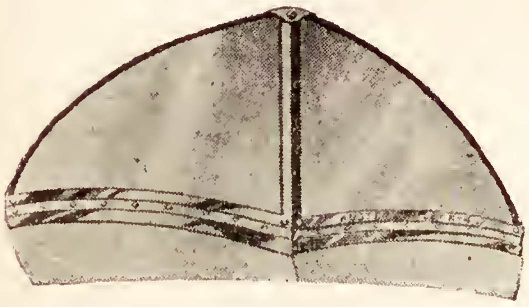

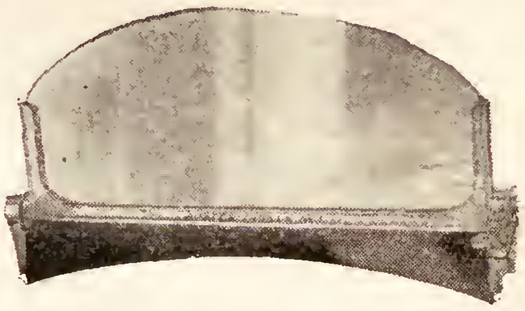

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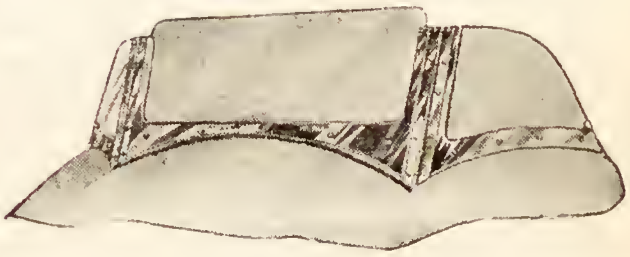

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De Havilland Aircraft Co., Ltd., Stag Lane Aerodrome, Edgware. Kingsbury 160.
Fairey Aviation Co., Hayes, Middlesex.
Hayes 136-7-8.
The Gloucestershire Aircraft Co., Ltd., Sunningend Works, Cheltenham.
Brockworth Aerodrome, Glos.
Cheltenham 1161-2-3-4; "Glosaircra, Cheltenham."
Handley-Page, Ltd., Cricklewood.
Hampstead 7500.
H. G. Hawker Engineering Co., Ltd., Kingston-on-Thames. Kingston 1988.
N. V. Nederlandsche Vliegtuigenfabriek.
Rokin 84, Amsterdam.
Pander & Zonen, Zuid Binnensingel, Den Haag.
34160; "Pander."
Parnall, George, & Co., Coliseum Works, Park Row, Bristol.
4775 (2 lines); "Warplanes," Bristol.
Roe, A. V., Ltd., Manchester. City 8530, 8531, Manchester: "Triplane," Manchester.
Hamble, near Southampton:
Hamble 18: "Roe," Hamble.
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Chatham 627; "Seaplanes." Rochester.
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Yeovil 141 (4 lines); "Aircraft, Yeovil."

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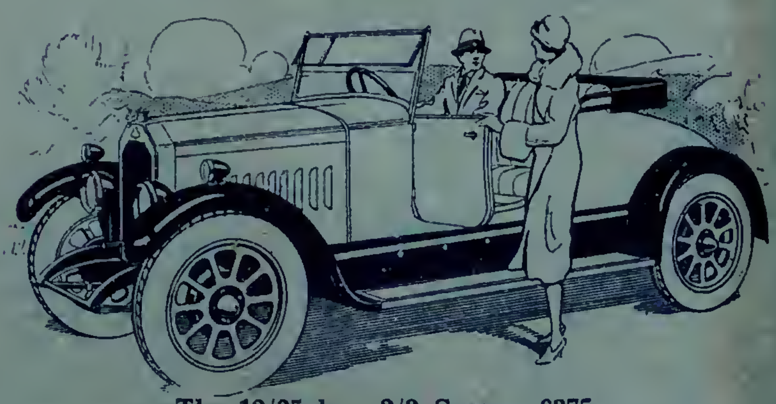

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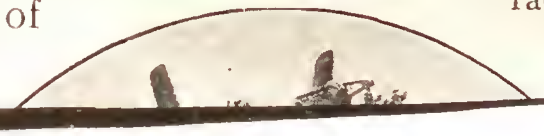

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Flight

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CONTENTS

Editorial Comment PAGE
Private Flying ... 71
Launching First Australian Supermarine "Seagull" ... 73
Hawker Light 'Plane ... 77
Light 'Plane Club Doings ... 77
A.N.E.C. III ... 78
Correspondence ... 81
Royal Air Force ... 83
R.A.F. Intelligence ... 83
Air Ministry Notices ... 84

DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:—

1926	
Feb. 23	Mr. E. W. Parsons, A.M.I.Ae.E. Discussion, "Civil Aviation," before Inst.Ae.E.
Feb. 25	Mr. A. J. Cobham. "Long-Distance Aeroplane Flights," before R.Ae.S.
Mar. 4	Maj. G. H. Scott. "Development of Airship Mooring," before R.Ae.S.
Mar. 9	Mr. O. E. Simmonds, M.A., A.F.R.Ae.S., M.I.Ae.E. "The Development of Civil Marine Aircraft," before Inst.Ae.E.
Mar. 18	Flight-Lieut. H. Cooch. "Landing Aeroplanes in Fog," before R.Ae.S.
Mar. 22	Entries close for Gordon Bennett Race.
Mar. 22	Entries close for Schneider Cup Race.
April 13	Mr. S. H. Evans, A.F.R.Ae.S., M.I.Ae.E. "The Performance of Modern Aircraft—with special reference to the Variable Wing," before Inst.Ae.E.
April 15	Capt. G. T. R. Hill. "The Tailless Aeroplane," before R.Ae.S.
April 21	Inst.Ae.E. visit to Messrs. D. Napier and Son, Acton.
April 29	Lieut.-Col. V. C. Richmond. "Results of Recent Airship Flight Tests," before R.Ae.S.
July —	German Seaplane Competition at Warnemunde.

EDITORIAL COMMENT.

THE subject to be discussed at the next Monthly House Dinner of the Royal Aero Club, which is to be held on Wednesday of next week, February 17, will be "Private Flying." It may be remembered that at the first of these dinners several speakers referred to the rules which govern private flying in this country, and that the general opinion appeared to be that the existing rules are unnecessarily strict. In point of fact, several of the statements made concerning the regulations were inaccurate, and it is to be feared that we ourselves in our Editorial Comment on the subject at the time, did not quite distinguish clearly enough between the rules governing private flying and those with which "flying for hire or reward" is hedged around. For all that, we are unrepentant, and we still believe that a relaxation of some of these regulations would have a beneficial effect upon the use of aeroplanes for pleasure flying in this country. The effect of the present regulations is, perhaps, psychological rather than practical, but it will scarcely be denied that it is very real for all that. The type of man who contemplates purchasing his own aeroplane for use as a touring vehicle, perhaps to carry an occasional passenger for a pleasure trip, but certainly not with any idea of turning into an aerial taxi driver, or, as the regulations have it, "flying for hire or reward" (at least not a reward which brings the machine into the "commercial" class), is very likely indeed to be put off when he learns that a not inconsiderable number of formalities have to be gone through before he can take his newly-acquired aeroplane for a flight away from an aerodrome. It may be perfectly true, as maintained by Sir Sefton Brancker at the first club dinner, that when examined closely these formalities do not really amount to very much, but we are firmly convinced that, as we have just said, the psychological effect is considerable, and we know of more than one prospective private owner who, on investigating the subject, came to the conclusion that he "could not be bothered." In any future discussion of the subject, this fact should not be overlooked.

Private Flying

We look forward to the discussion of private flying at the forthcoming club dinner, and many diverse and divergent views should be put forward. In the meantime, the Royal Aero Club has appointed a committee to look into the matter, and the secretary has sent out a communication which is published in the Correspondence columns of this week's issue of Flight. The Air Ministry has also formulated suggestions for amending the present regulations. To some extent such amendments would necessitate taking up the matter at forthcoming meetings of the International Commission on Air Navigation, but as the type of private aeroplane for the benefit of which it is proposed to amend the rules is intended for flying within the borders of Great Britain only, very considerable liberty presumably exists, and too much attention need not be given to those who would make much of the international side of the question. At the outset the prospective owner-pilot would have to make up his mind whether he will pay somewhat more for his machine, and will put up with the necessary formalities so that, should he at any time decide to use his machine for touring abroad, he will be able to do so, or whether he will confine his flying to this country and by way of compensation will have fewer regulations to contend with and probably a cheaper machine.

The committee appointed to look into the subject of private flying is attempting to ascertain the views of members as to whether paragraph 3 of Air Ministry Notice to Airmen No. 56 of 1925, should be simplified. This paragraph refers to a technical examination, and we personally think that, although some knowledge of the " laws of the air " is essential, there is little need for every owner-pilot to be a sort of " air lawyer." We are therefore all in favour of simplifying this examination. Concerning the medical examination, we very much doubt whether such an examination is necessary. When a man purchases a motor car he is not required to furnish proof that he has lungs like a blacksmith's bellows, a heart like a petrol pump, or telescopic eyesight. And it seems very certain that the risk to third party is infinitely smaller in the case of aircraft.

A pilot's licence is, of course, an absolute necessity, but the issue of such should be in the hands of the Royal Aero Club, which was able to arrange these things quite nicely, thank you, many years before a misguided Air Ministry discovered that it, and it alone, was qualified to judge these things.

Probably the greatest controversy of all will centre around paragraph 12, which deals with the certificate of airworthiness. On this subject we have written in Flight until our readers must have been getting tired of reading, but once more we venture to try their patience by referring to the matter. The Aero Club desires an expression of opinion as to whether the issue of a certificate of airworthiness should rest with the Air Ministry or be entrusted to the constructor of the machine. Personally we cannot see that there can be any doubt at all in the matter. Provided the machine is built by one of the existing aircraft firms, there should be no necessity whatever for the Air Ministry to mix itself up in the matter in any way, either as regards A.I.D. inspection or in any other way. The constructor has his reputation to guard and is not likely to hold that responsibility lightly. We are absolutely convinced that constructors should be given an entirely free hand, and we are equally certain that one result would be a very considerable reduction in the price of machines. Should any new firm come forward and desire to construct private aeroplanes the matter would have to be reviewed somewhat, but in that case we fail to see why a specially appointed committee of the Royal Aero Club—or, if preferred, of the Royal Aeronautical Society—should not decide whether or not the proposed design was likely to be structurally sound. The great thing is to get private flying removed as far as possible from the hampering influence of the Air Ministry. We are aware that there is a feeling in certain quarters that by its subsidy to the light 'plane clubs the Air Ministry has acquired some sort of authority of the " paying-the-piper, calling-the-tune " variety, but the fact of the matter is, of course, that the Air Ministry is faced with the obligation to " develop the air sense," and is not thus acting in quite the altruistic spirit some would have us believe.

As regards after-inspection, when the machine has been in use for some time, here again we think this could be safely left to a qualified representative of the constructing firm, possibly in conjunction with a Royal Aero Club official. After all, it is in the interest of the firm to see that their machines are not permitted to get into a bad state.

The necessity for journey log-books is a very doubtful quantity. Probably the owner-pilot will wish, for his own information, to keep some sort of a record of how many hours' flying he has done, and this should suffice.

◆ ◆ ◆ ◆

The Spanish Transatlantic Flight

Comandante Franco, the Spanish aviator, and his three companions have successfully concluded the second chapter of their wonderful flight from Spain to South America in an Italian Dornier-Wal flying-boat fitted with two Napier " Lion " engines.

They left Recife, Pernambuco, at 5.15 a.m. on February 4 and, following the line of the Brazilian coast, accomplished another remarkable non-stop flight of 1,260 miles to Rio de Janeiro, where they arrived at 5.5 p.m.—that is, just under the 12 hours. Needless to say, the Spanish airmen were accorded a most enthusiastic welcome ; in fact, by the time the day came to a close they were more fatigued from the effects of the many greetings and embraces received than they were from their 12 hours' hard flying. On February 9 they left Rio de Janeiro at 5.15 a.m. for Montevideo and Buenos Aires. Slight engine trouble, however, compelled a return to Rio, but they got away again at 7.20 a.m. Amidst intense excitement they arrived at Montevideo—another 1,200-mile non-stop—at 7.34 p.m. The " Ne Plus Ultra " left again at 7.45 p.m., and at the moment of writing, news to hand states that Comandante Franco has completed the 150 miles or so to Buenos Aires.

Last week the British Government received the following cablegram from the chief of the Spanish Directory :—

" I highly esteem your congratulations to our Government on the brilliant accomplishment of our airmen, who by their enterprise have shown the extraordinary qualities which have always been maintained by our ancestors and by all Spanish citizens who wish to serve the progressive ideals of humanity to the glory of Spain."

Sir Samuel Hoare, Secretary of State for Air, has received the following reply to his telegram of congratulation to the Spanish Minister of War, in regard to the transatlantic flight :—" The Spanish Air Service warmly thanks you for the congratulations of so high an authority in the world of aviation."—(Signed) Duke of Tetuan, Minister of War.

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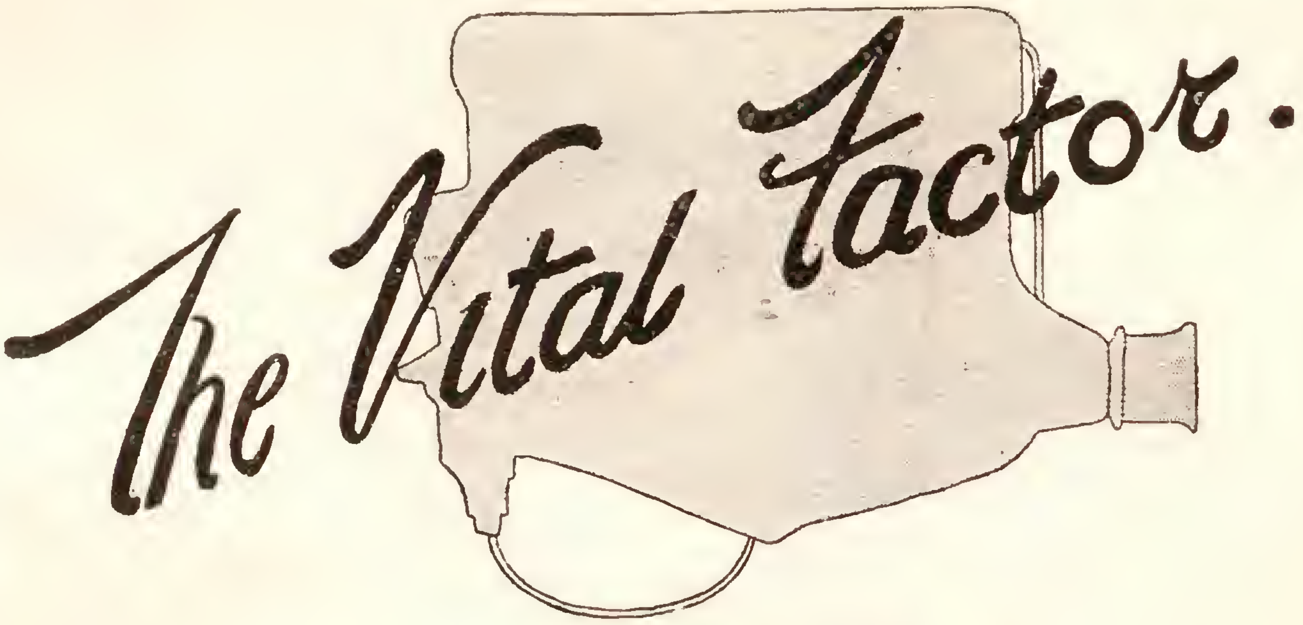
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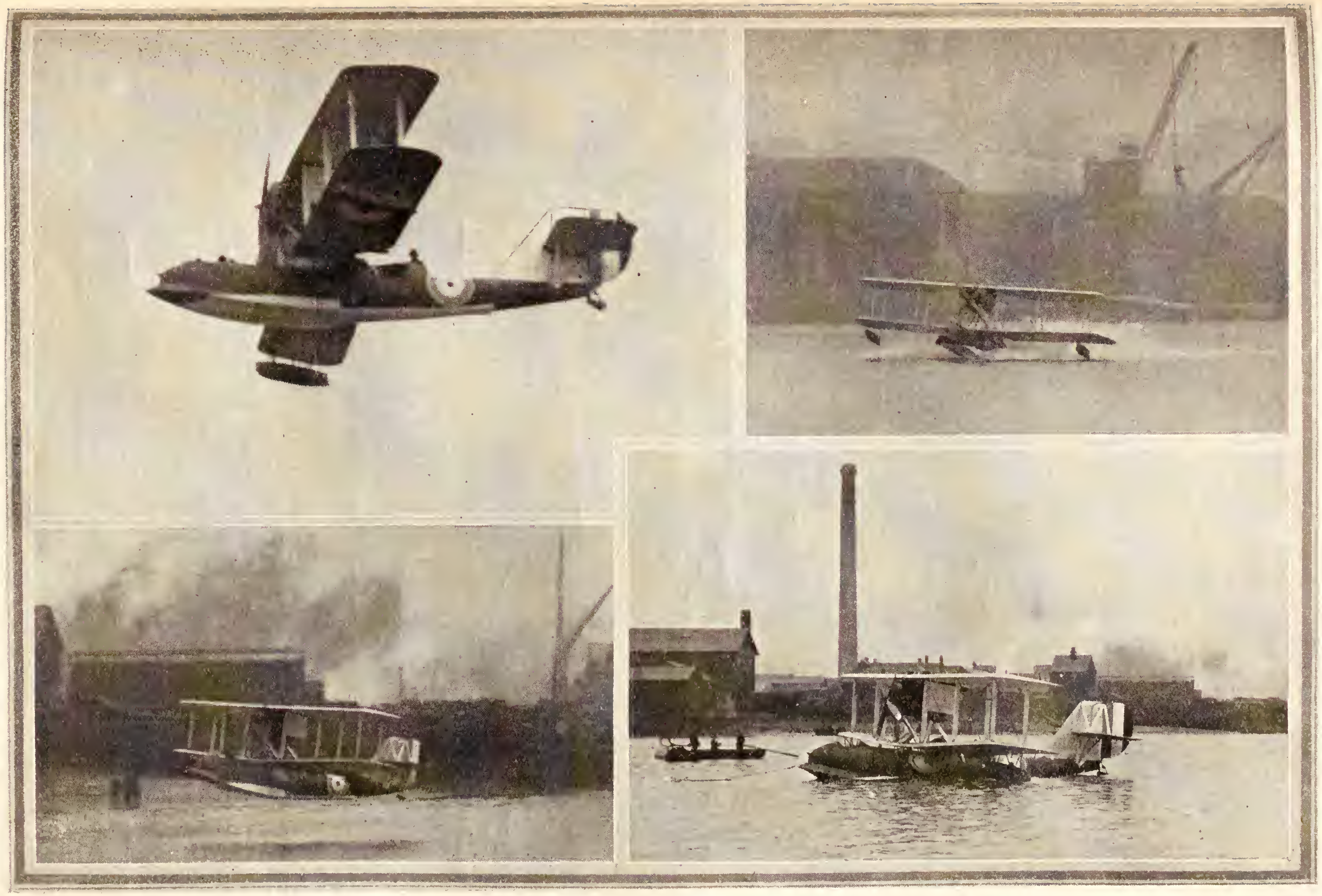


[FLIGHT *Photographs.*

"SEAGULLS" FOR AUSTRALIA: These four views show the Supermarine "Seagull," piloted by Captain Biard and carrying as passengers Sir Joseph Cook and Squadron-Leader Brown, taking off, in flight, alighting, and moored to a buoy. Two of these photographs give an indication of the poor visibility obtaining at the time of the flight.

"SEAGULLS" FOR AUSTRALIA

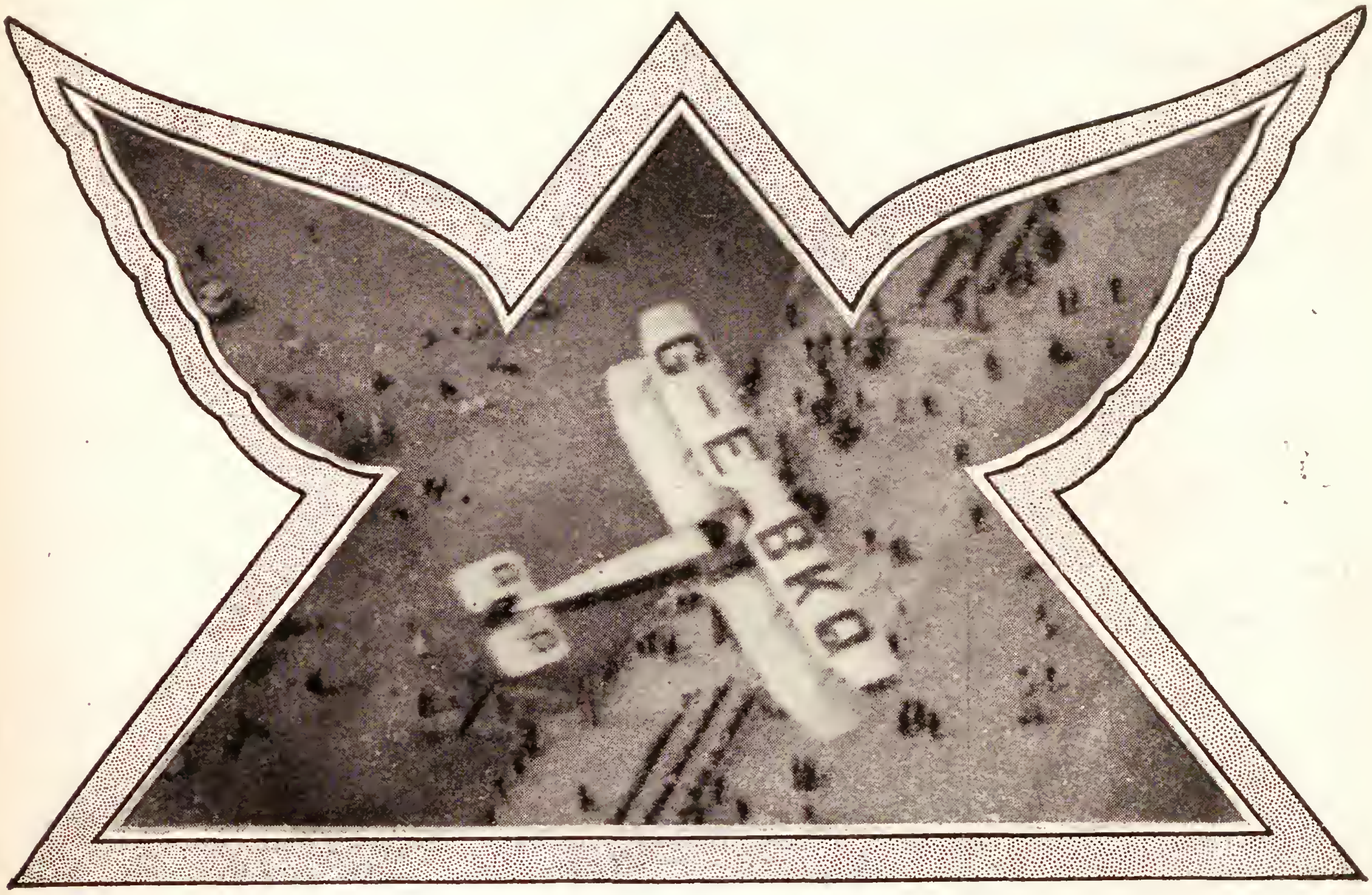
Lady Cook, D.B.E. Launches the First of a Batch at Southampton

To those who believe that the seaplane, and by the term we understand flying-boats as well as twin-float machines, is destined to play an important rôle in the future development of the British Empire, Saturday, February 6, 1926, was a red letter day, for on that day the official launch took place, at Southampton, of the first of a batch of Supermarine "Seagull" amphibian flying-boats ordered by the Australian government. These machines, of which large numbers have been delivered to the British air forces at home, are three-seater amphibian reconnaissance machines, and one of their first duties in Australia will, we understand, be the surveying of the Great Barrier Reef, although they will also be employed for training and other purposes. As the "Seagull" has been illustrated and described in FLIGHT it is unnecessary to describe the machine here. Suffice it to say that it is of typical Supermarine lines, with a boat-planked hull of the resilient or Linton Hope type, and is characterised by the fact that the Napier "Lion" engine drives a tractor airscrew. A result of this arrangement is that although the pilot is placed in the nose of the hull, the gunner and observer are accommodated aft of the wings, a position which a "pusher" airscrew would render somewhat difficult. The machine has a retractable undercarriage so as to be able to get off from or alight on land or sea at will, or from the deck of a vessel. When raised, the wheels swing outwards and upwards towards the lower plane.

[FLIGHT *Photographs.*

CHRISTENING THE FIRST AUSTRALIAN "SEAGULL": At Southampton the christening ceremony and launching of the first of a batch of Supermarine "Seagulls" built for Australia took place on February 6, when Lady Cook christened the machine and Sir Joseph Cook, High Commissioner for Australia, made a flight over the Itchen and Southampton Water. The upper group includes a number of well-known personalities present at the ceremony, and in the lower photographs Lady Cook is seen (on the left) cutting the cord, while on the right the bottle of champagne may be seen at the moment of striking the anchor secured to the bows of the "Seagull."

On Saturday last a distinguished party, numbering close upon 100, travelled to Southampton, where motor vehicles met the train and conveyed the guests to the Supermarine Works at Woolston. Here the visitors were met by Mr. G. L. Wood, Chairman of the Supermarine Aviation Works, Commander James Bird, Managing Director of that firm, Sir Harry Brittain, director of D. Napier and Son, and Mr. H. T. Vane, Managing Director of Napier's. After a tour of



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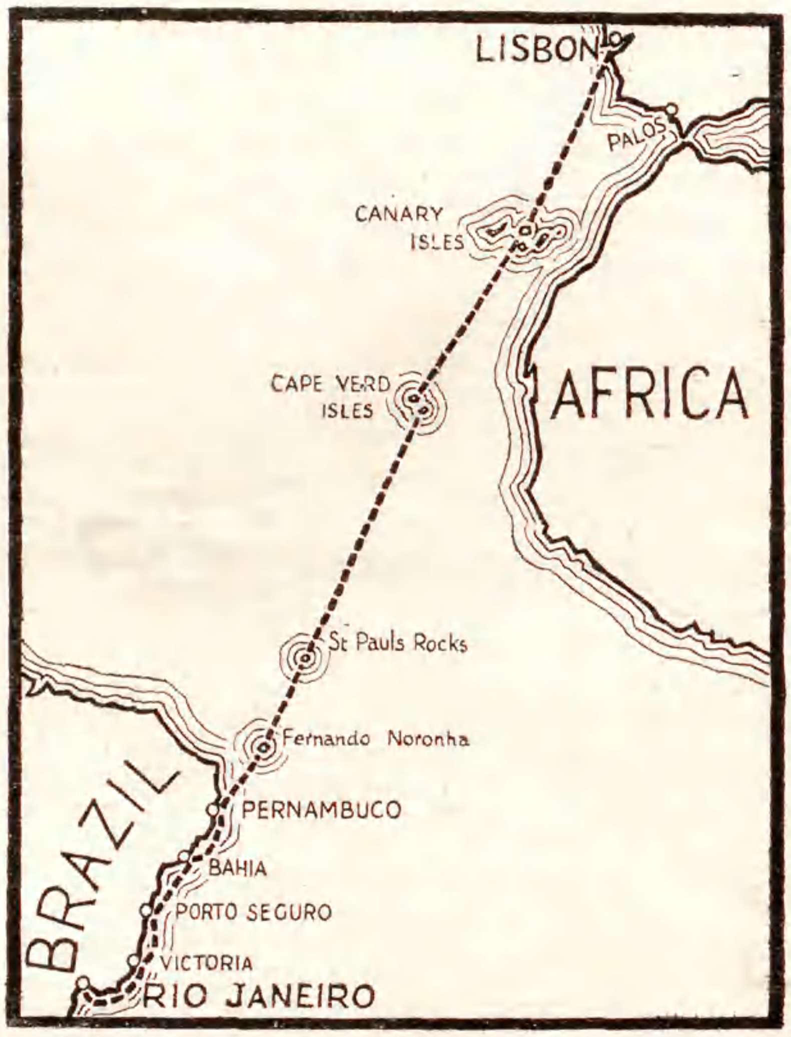

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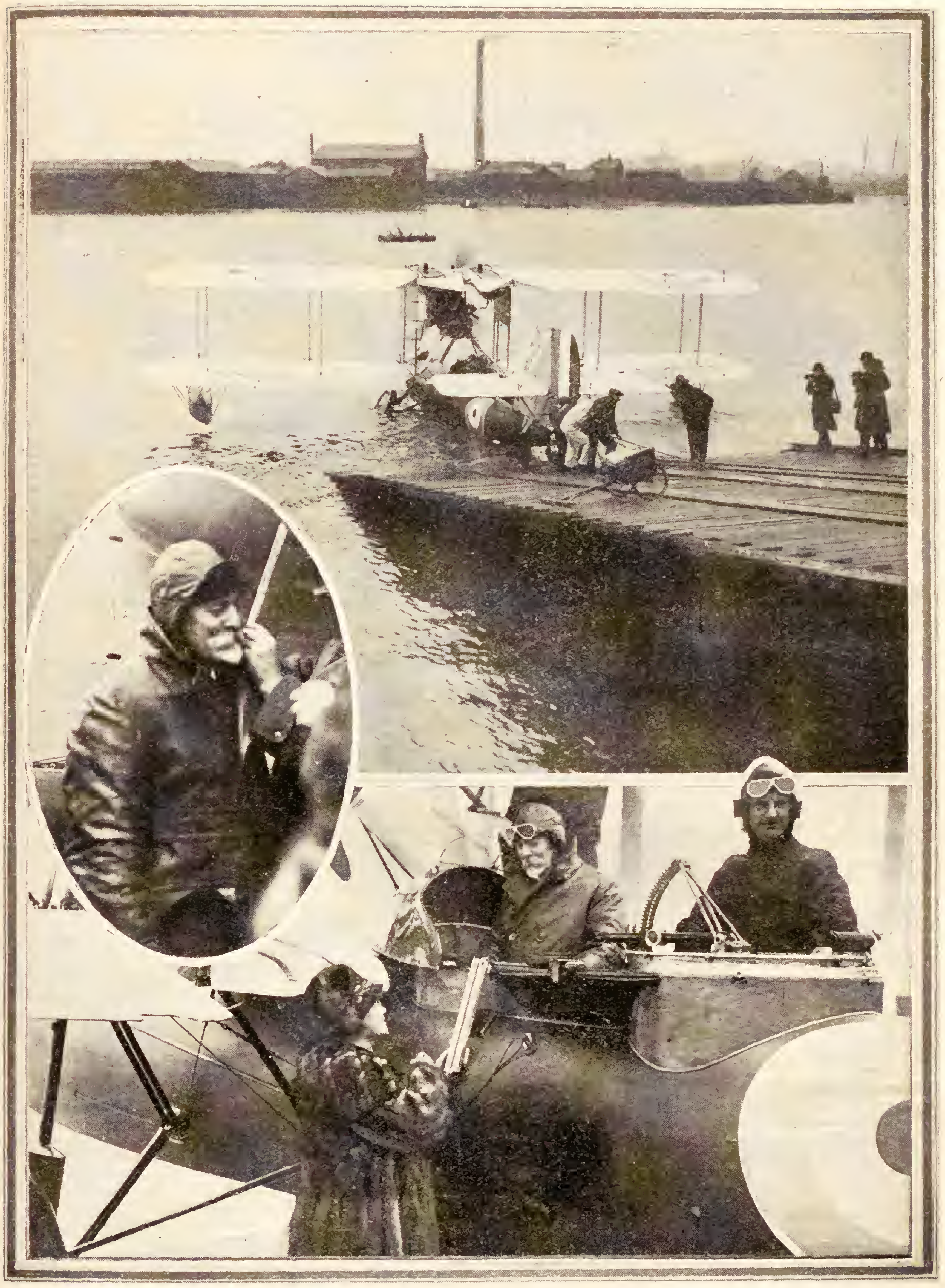


[Flight *Photographs.*

LAUNCHING THE FIRST AUSTRALIAN "SEAGULL": The upper photograph shows the machine leaving the slipway at Woolston, piloted by Capt. Biard and carrying as passengers Sir Joseph Cook, High Commissioner of Australia, and Squadron-Leader Brown, Liaison Officer of the R.A.A.F. The lower photograph shows Sir Joseph having a final chat with Lady Cook before the start of the flight, and in the inset Sir Joseph having his flying cap adjusted inspection of the Supermarine works, during which a number of "Southamptons" were inspected with the greatest interest, the visitors were shown the "Seagull" about to be launched.

The christening ceremony was then performed by Lady Cook D.B.E., wife of Sir Joseph Cook, High Commissioner for Australia, who broke a bottle of champagne on the bows of the machine, with the words "I name you 'Australian Seagull I.' Good luck to you and to all who fly in you. God bless you."

Immediately after the christening ceremony the machine was brought out of its shed and run down the slipway, where Sir Joseph Cook embarked, as did also Squadron-Leader Brown, Liaison Officer of the Royal Australian Air Force. Captain Biard, the famous Supermarine test pilot, was at the wheel. A cheer greeted the machine as it left the slipway and took the water, and after raising the wheels Capt. Biard taxied up the Itchen to get a start down-stream against the wind. A few minutes were spent in waiting for the "floating bridge" running between Southampton and Woolston to get out of the way, and then Capt. Biard opened his engine, and the "Seagull" rose after a short and very clean run, getting "unstuck" immediately opposite the slipway, and thus giving the visitors an excellent view. Amid renewed cheers, the machine headed for Southampton Water, where it was soon lost to sight in the drizzle, soon to appear again. After circling a few times a perfect landing was made, and Captain Biard taxied up to a buoy where he moored the machine. The mooring operation was one of the neatest we have ever seen, Capt. Biard judging speed and tide to a nicety. Sir Joseph Cook and Sq.-Ldr. Brown were then fetched ashore in a launch, and the party were conveyed to the South Western Hotel, where a luncheon was given, presided over by Mr. G. L. Wood.

This handsome silver rose bowl, which was presented to Lady Cook at Southampton on Saturday last, carries the inscription : Presented to Lady Cook, D.B.E., on the occasion of her launching the first Australian "Seagull" flying boat, by the Supermarine Aviation Works, Ltd., and D. Napier & Son, Ltd., Southampton, England, February 6, 1926.

Commander J. Bird said he did not propose to take up much time, since the guests were catching a train after lunch, and that they must assume even the Southern to be punctual. He regretted that among those who had been unable to be present at the christening of the first Australian "Seagull" were Sir Samuel and Lady Hoare, Sir Hugh and Lady Trenchard, and Sir Geoffrey and Lady Salmond, as well as representatives of the Board of Trade and Southampton Harbour Board. The latter were at that moment present at the reception given to the captain and crew of the s.s. *Roosevelt*, in recognition of their gallant work in rescuing the crew of the *Antinoe*. He wished to thank very heartily Sir Joseph and Lady Cook for coming down, and said he was deeply conscious of the great honour shown his firm by the distinguished High Commissioner for Australia and his wife in coming down to launch the first amphibian flying-boat to be built for Australia. With regard to Sir Joseph Cook's first flight, he thought Sir Joseph's landing was as good as that of his great namesake in Australia. In conclusion, he asked Lady Cook to accept, in commemoration of her launching of the first Australian "Seagull," a silver rose-bowl filled with roses.

Sir Harry Brittain, M.P., referred humorously to the antiquated toll-gates of Southampton district, and to the usual drizzling rain which one always expected to find in hoary old England. He referred briefly to the Australian Air Force, which was at the moment composed of 100 officers and 500 men, and to the splendid flight of Commander Goble around Australia. Sir Harry next gave a few brief impressions of his flight in Australia recently, when he went over in connection with the Empire Press Conference, and said by making use of the air he was enabled to see more in one day of that great country than others were able to see in several weeks. Touching on the use of seaplanes and flying-boats, Sir Harry mentioned that he understood there was some talk of a French air service whose flying-boats would alight on the Thames. While he welcomed this as a step in progress, he expressed the hope that a similar facility would be given for British machines to alight on the Seine. On the subject of the proposed reductions in the Air Estimates, Sir Harry called attention to the risks which such reductions might bring with them, and uttered a word of warning that Great Britain should be very careful not to get below the danger line in such reductions.

During his speech Sir Harry referred to Sir Joseph Cook and to his great namesake, Captain Cook, as well as to the Air Station at Point Cook in Australia, and mentioned how curious it was that the name Cook kept cropping up.

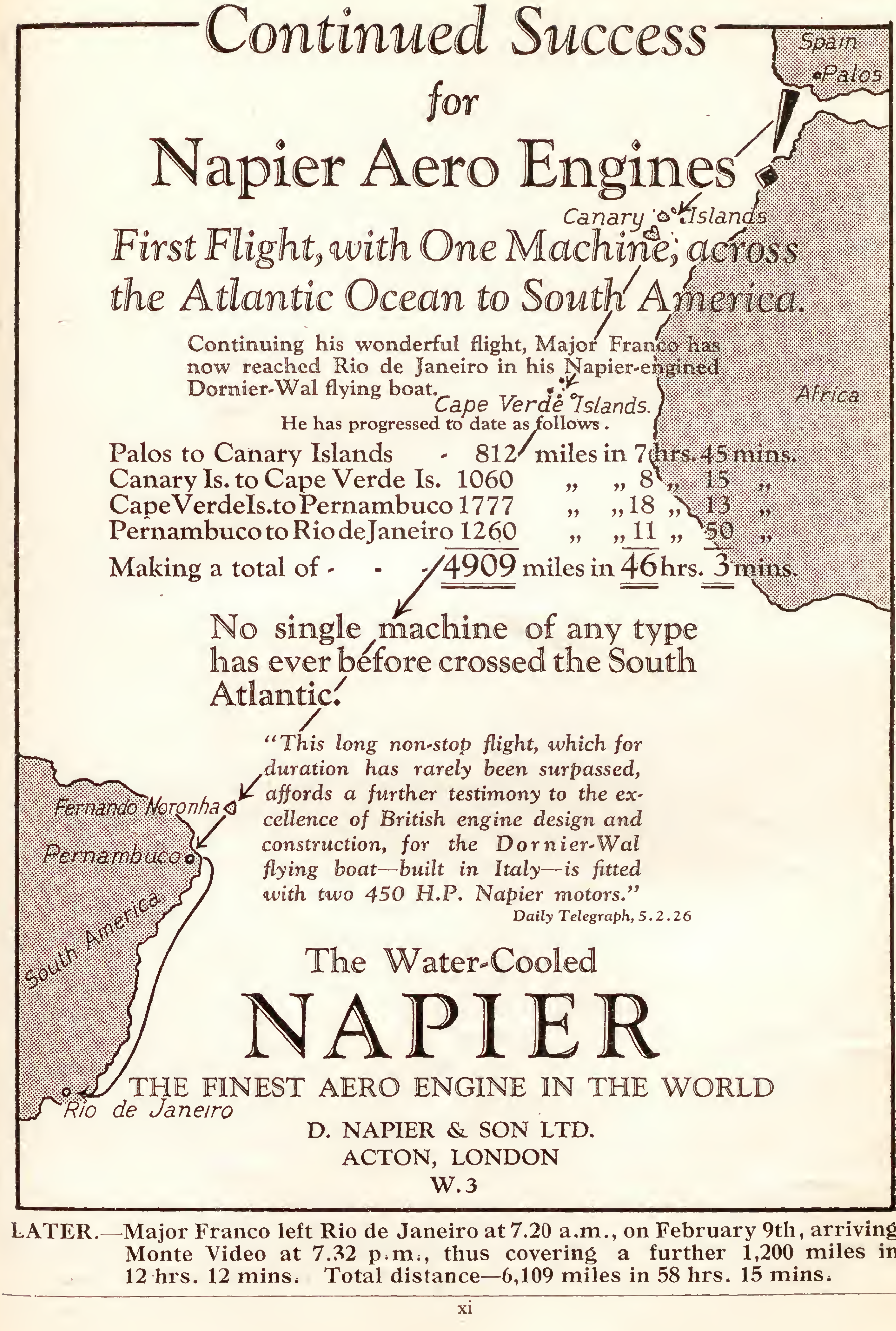
Sir Joseph Cook, High Commissioner for Australia, said with reference to the name Cook, he had heard it so often and in connection with such great men, that he had come to be not ashamed of it. He was very pleased to be present on that occasion, and had been greatly impressed by his first flight. The defence of Australia was a difficult problem, and Australia's coast line of some 12,000 miles presented a problem of patrolling which could only be solved by aircraft. On the same general subject of defence Sir Joseph pointed out that with a population of six millions Australia was spending at the rate of five million pounds per annum on defence, which showed that Australia was doing a good share of the Empire defence. As an island, although a large one, it must depend mainly on marine defence, and he considered that day a beginning in marine aircraft defence as far as Australia was concerned. He referred to Australia's desire to standardise in such a way that every ship, every unit, every gun, every aeroplane, every seaplane, and every man, would fit into the scheme for Imperial defence. Sir Joseph also referred to the work being done by the air lines in Australia, and said that although a good beginning had been made they would not be satisfied until they had air services around the entire coast of Australia.

Speeches were also made by Lord Apsley, M.P., for Southampton, by Sir William Cullen, K.C.M.G., Chief Justice and Lieutenant-Governor of New South Wales, and by Sir James Allen, High Commissioner for New Zealand.

The visit to Southampton then came to a close, and the party was conveyed to the station, where it was found that for once the Southern Railway was punctual.

A noteworthy feature of the day was that everything went absolutely without a hitch and to scheduled time.

Among those present were: Sir James Allen, High Commissioner for New Zealand; Lord and Lady Apsley; Eng.-Com. Brand, R.A.N.; Sir T. A. Coghlan, Agent-General for New South Wales; Lady Coghlan; The Hon. H. P. Colebatch, Agent-General for West Australia; Sir William Cullen, Chief Justice and Lieutenant-Governor of New South Wales, and Lady Cullen; Brig.-General Dodds, Military representative of the Commonwealth of Australia, The Hon. J. Huxham, Agent-General for Queensland; Mr. C. Neal, Acting Agent-General for Victoria; Dr. Ethel Osborne; J. Lloyd Price, Agent-General for South Australia; Councillor J. E. Silverman, Mayor of Southampton, and Mrs. Silverman; Colonel R. Eccles Snowden, Agent-General for Tasmania, and Mrs. Eccles Snowden; and Captain J. B. Stevenson, Naval Representative of the Commonwealth of Australia in London.



Continued Success
for
Napier Aero Engines

First Flight, with One Machine, across the Atlantic Ocean to South America.

Continuing his wonderful flight, Major Franco has now reached Rio de Janeiro in his Napier-engined Dornier-Wal flying boat.

He has progressed to date as follows.

Palos to Canary Islands -	812	miles in	7 hrs.	45 mins.
Canary Is. to Cape Verde Is.	1060	„ „	8 „	15 „
Cape Verde Is. to Pernambuco	1777	„ „	18 „	13 „
Pernambuco to Rio de Janeiro	1260	„ „	11 „	50 „
Making a total of - - -	4909	miles in	46 hrs.	3 mins.

No single machine of any type has ever before crossed the South Atlantic.

> *"This long non-stop flight, which for duration has rarely been surpassed, affords a further testimony to the excellence of British engine design and construction, for the Dornier-Wal flying boat—built in Italy—is fitted with two 450 H.P. Napier motors."*
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> *Daily Telegraph, 5.2.26*

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LATER.—Major Franco left Rio de Janeiro at 7.20 a.m., on February 9th, arriving Monte Video at 7.32 p.m., thus covering a further 1,200 miles in 12 hrs. 12 mins. Total distance—6,109 miles in 58 hrs. 15 mins.

THE DE HAVILLAND
"MOTH"
has the
AEROBATIC
CERTIFICATE OF
AIRWORTHINESS

A HAWKER LIGHT 'PLANE AND THE R.A.E. LIGHT AERO CLUB

REFERENCE has previously been made in FLIGHT to the fact that a Hawker "Cygnet" light 'plane had been presented to the R.A.E. Light Aeroplane Club, Farnborough, by the Hawker Engineering Co., Ltd., of Kingston. This week we are able to give our readers some further information regarding the matter.

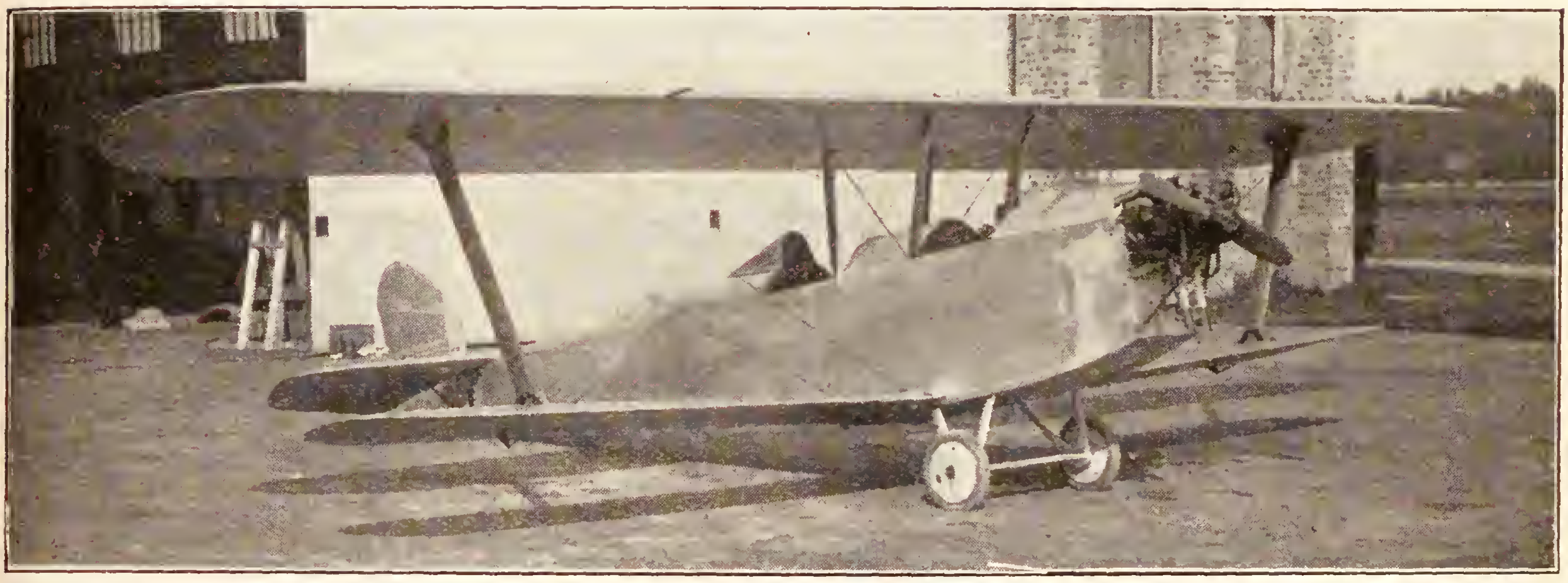
It may be mentioned, in the first place, that the Hawker Engineering Co., Ltd., designed and constructed two "Cygnet" machines for the 1924 Light Aeroplane trials. The machines were sent to Martlesham after the 1924 trials, for test in the usual manner. Various delays—due to engine trouble—occurred during these tests, and eventually the machines were brought back to Brooklands.

One of the "Cygnets" was entered in the 1925 Competitions at Lympne, where, it will be remembered, piloted by Flight-Lieut. Bulman, it won the International Handicap, and in other respects did very well. The second "Cygnet" was kept at Brooklands, the Hawker Engineering Company intending to use it for further research and experimental work.

During a visit to Farnborough, and the R.A.E. Light Aero Club, Mr. Sigrist—who is joint managing director with Mr. T. O. M. Sopwith of the Hawker Engineering Co.—was very favourably impressed with the enthusiasm displayed by the R.A.E. Light Aero Club, and the Hawker directors decided, in order to assist the club, to present them with the "Cygnet" which was flown by Mr. F. P. Raynham in the 1924 Light 'Plane trials.

The R.A.E. Light Aero Club, in accepting the machine, expressed their gratitude for this generous gift, and the machine has now been fitted with a Bristol "Cherub" engine in anticipation of this year's events. Originally this machine was fitted with a 30 h.p. A.B.C. "Scorpion" engine; it is a tractor fuselage biplane, the main characteristics of which are: large top plane (28 ft. span by 4 ft. 3 in. chord) and smaller lower plane (23 ft. span by 2 ft. 6 in. chord), single I-interplane struts with outward rake, and variable camber wing flaps fitted to the top plane, which help to reduce the landing speed.

In conclusion, many of our readers will remember that the R.A.E. Light Aero Club designed and constructed a light 'plane, the "Hurricane" monoplane, for the 1923 Light 'Plane trials, which also took part in the 1924 and 1925 meetings.



THE HAWKER "CYGNET" LIGHT BIPLANE: The above machine has been presented by the Hawker Engineering Co., Ltd., to the R.A.E. Light Aero Club of Farnborough. It is now fitted with a Bristol "Cherub" engine instead of the A.B.C. "Scorpion" originally fitted (as shown above).

◆ ◆ ◆ ◆

LIGHT 'PLANE CLUB DOINGS

London Aeroplane Club

FLYING during the week has again been very limited on account of the weather. To the previous troubles of wind and fog we have had to contend with the flooded state of the aerodrome. In spite of all these drawbacks, our one machine managed to put in 13 hrs. 10 mins.

The following members had flying instruction: R. C. Brighten, S. C. Richards, D. S. Brough, C. E. Murrell, W. Hay, V. H. Doree, E. A. Cook, C. H. Gould, J. S. M. Michie, Mrs. Atkey, D. P. H. Esler, P. O. Bradshaw, R. P. Cooper, E. D. Moss, T. C. Angus, Sir John Rhodes, N. Jones, A. Lees.

The following members made solo flights: Mrs. Eliott-Lynn, Sqdn.-Ldr. M. E. A. Wright, P. G. Lucas.

Negotiations are practically completed for replacing G-EBLU with another D.H. Moth. It is hoped to take over the new machine during the week.

The Lancashire Aero Club

FLYING took place on Friday and Saturday. Owing to Mr. Scholes's absence on "the flight towards Manchester," Mr. Cantrill gave all the instruction. Tests occupied 30 mins. Dual, 2 hrs. 20 mins.; solo, 55 mins.; total, 3 hrs. 45 mins.

The following had instruction:—

C. Agar, 35 mins.; B. Smith, 30 mins.; M. Lacayo, 5 mins.; A. Goodyear, 15 mins.; W. Colley, 20 mins.; S. E. Rodman, 10 mins.; P. Michelson, 25 mins.

Solo flights by M. Lacayo, 30 mins.; A. Goodyear, 25 mins.

The Newcastle-upon-Tyne Aero Club

THE week ending February 7 was one of the worst, as regards weather, that has been experienced since the club commenced operations, with rain and fog almost continuous. No flying at all was possible on the Monday, Tuesday or Saturday, and the total time flown was only 11 hrs. 55 mins.

The following had dual instruction with Maj. Packman:—

Messrs. T. R. MacMillan (6 hrs. 15 mins.), H. Ellis (15 mins.), C. Thompson (35 mins.), J. D. Irving (45 mins.), W. Todd (30 mins.), G. H. Twine (30 mins.).

Mr. R. N. Thompson carried out one flight of 35 minutes on Wednesday with Mr. Hetherington as passenger, and another of 45 minutes with Maj. Packman as passenger on Sunday.

Maj. Packman took Mr. Ebermall for a 15 minutes' joy ride on Sunday.

Report for January.—Although one machine was off service from the 6th, the amount of flying carried out during January was even better than for December, in spite of the worst possible weather conditions, chiefly wind and fog.

	Number of Flights.	Time. Hrs.	mins.
Dual training	73	39	49
Solo training	14	9	10
"A" pilots	25	14	3
Test and passenger flights	35	6	27
Totals	147	69	29

Messrs. R. N. Thompson and W. T. Walton qualified for their licences early in the month, bringing the total qualified pilots up to six.

The lecture delivered by Maj. F. M. Green, designer of aircraft, Messrs. Armstrong, Whitworth and Co., Ltd., was very much appreciated by the members who attended, and the second of the series, "Tanks and Dragons with the Army Manœuvres, 1925," by Mr. Swinnerton Dyer, which will be on February 17, should also prove very interesting.

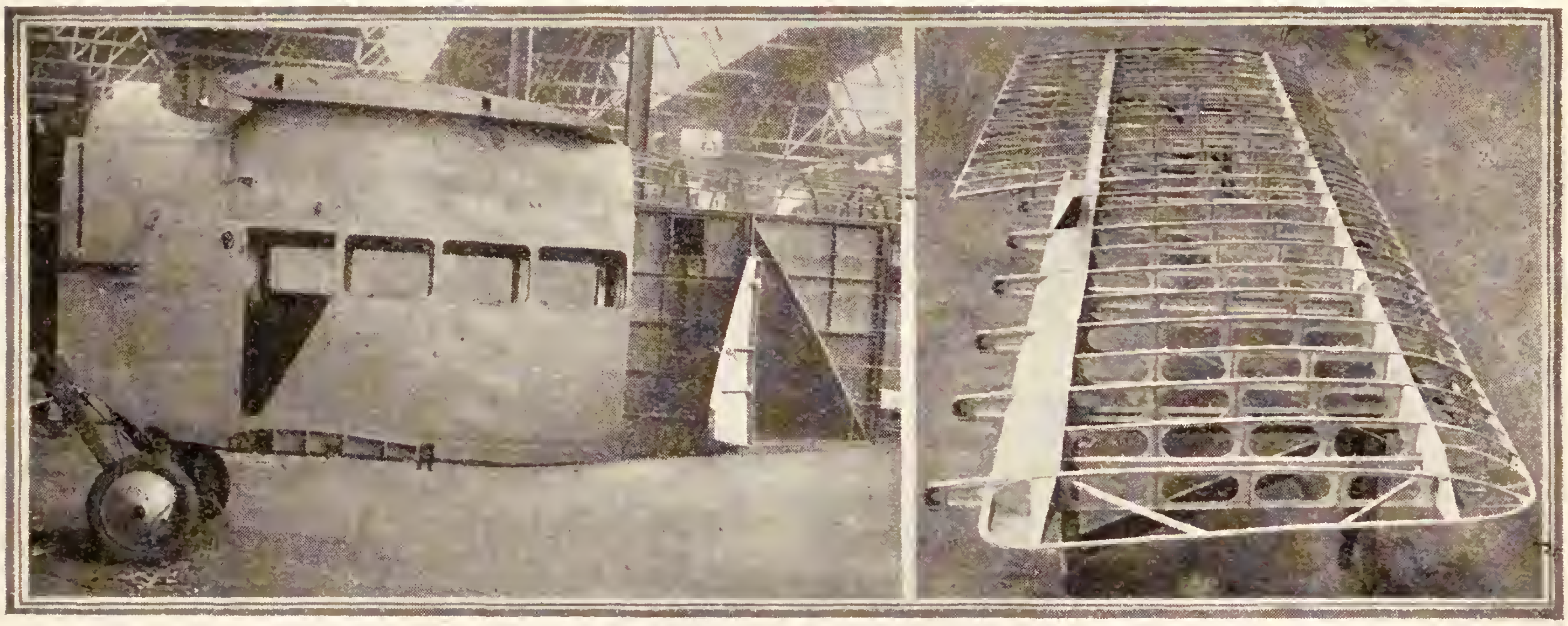
Visit to Armstrong College.—Members are invited by Comdr. C. J. Hawkes, R.N., Professor of Engineering of Armstrong College and Vice-President of the Club, to visit the Engineering Section of the College on Wednesday, February 24, at 7.15 p.m. Those who will be present should advise the Secretary not later than the 20th inst.

The next club whist drive takes place on March 3 at the Clubhouse, 7 p.m.

A NEW COMMERCIAL AEROPLANE FOR AUSTRALIA

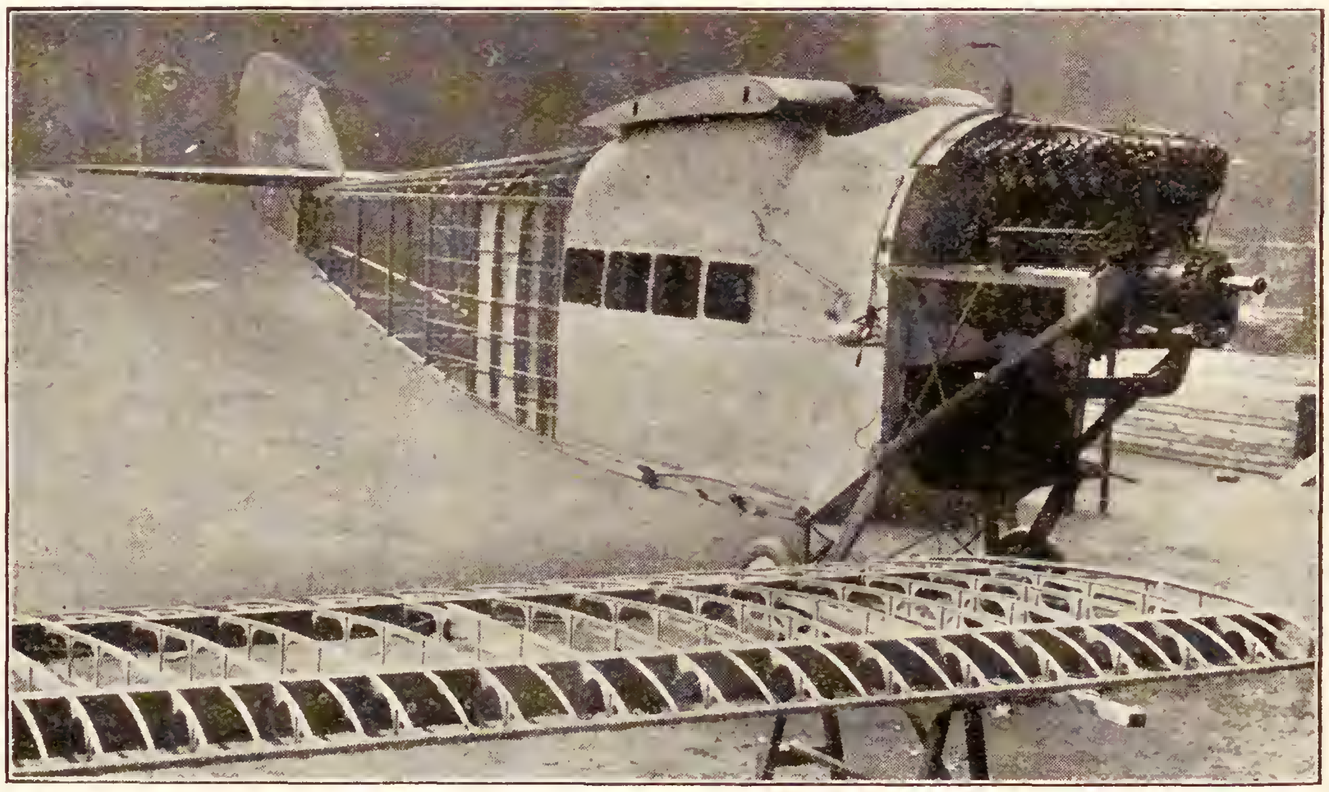
The A.N.E.C. III, with Rolls-Royce "Eagle IX" Engine

Australia is somewhat in the limelight at the moment. Elsewhere in this week's issue of Flight we publish a report and photographs of the launching of the first "Seagull" amphibian flying-boat built for the Australian Government. The following article and illustrations deal with a machine of a very different type, a commercial six-seater being built by the Air Navigation and Engineering Co., of Addlestone, for the Larkin Company of Australia.


[Flight *Photographs*.

THE A.N.E.C. III : On the left the front portion of the fuselage showing cabin, etc., and on the right one of the wings in skeleton. The undercarriage shown in the picture is a "jury" one used for wheeling the machine about in the works

In the construction of the A.N.E.C. III, as the new machine is styled, certain parts of the Handasyde monoplanes have been incorporated, but in spite of this fact the A.N.E.C. III is a totally different type of machine. The parts of the Handasyde monoplane to be used in the new machine are the passenger cabin and the engine mountings. All the rest is new construction, and these parts were used because by so doing a great deal of work was saved.


[Flight *Photograph*.

The A.N.E.C. III : Built for the Larkin firm of Australia this machine, fitted with a Rolls-Royce "Eagle IX" will carry six passengers and mails and goods. In front of the fuselage may be seen one of the wings resting on trestles.

The A.N.E.C. III is a tractor biplane characterised by a very long fuselage and large-span biplane wings of high aspect ratio. The span is 60 ft. and the chord of the top plane is 8 ft., while that of the bottom plane is 6 ft. Thus by far the larger proportion of the lifting surface is in the top plane, an arrangement which should make for efficiency. From the side elevation, it will be seen that the tail, or rather the vertical members of the tail, fin and rudder, seem to be very small. We are assured by the designer, Mr. John Bewsher, however, that the tail is quite large enough, owing to its long leverage (there is approximately three chord lengths between the trailing edge of the main planes and the leading edge of the tail plane).

Constructionally, the A.N.E.C. III is of very simple and straight-forward design, the fittings being the simplest possible and very robust, and the woodwork plain and commonsense. In the fuselage non-tapered longerons are used, the necessary proportioning from a strength point of view being carried out by shortening the bays towards the cabin. Thus, all the fuselage fittings are identical not only in type, but also in size, a feature making for cheapness of production.

The wings have I-section spruce spars and the form of the ribs is shown in the photographs. Ailerons are of the balanced type, supported on rib extension projecting beyond the rear spar, the balance portion lying in front of the pivots. The inter-plane struts are stream-line steel tubes.

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Looping photographs by courtesy of "Flight."

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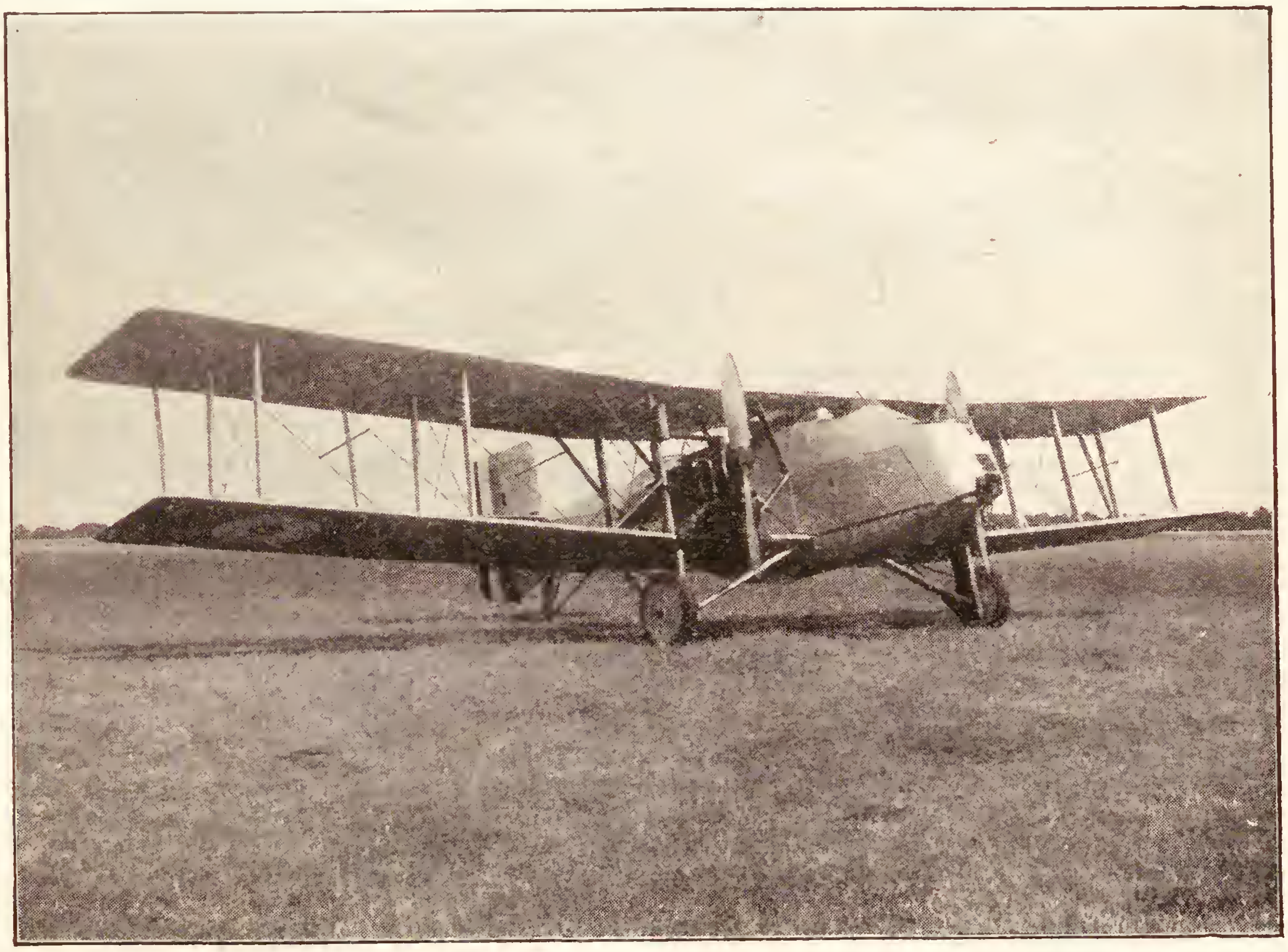

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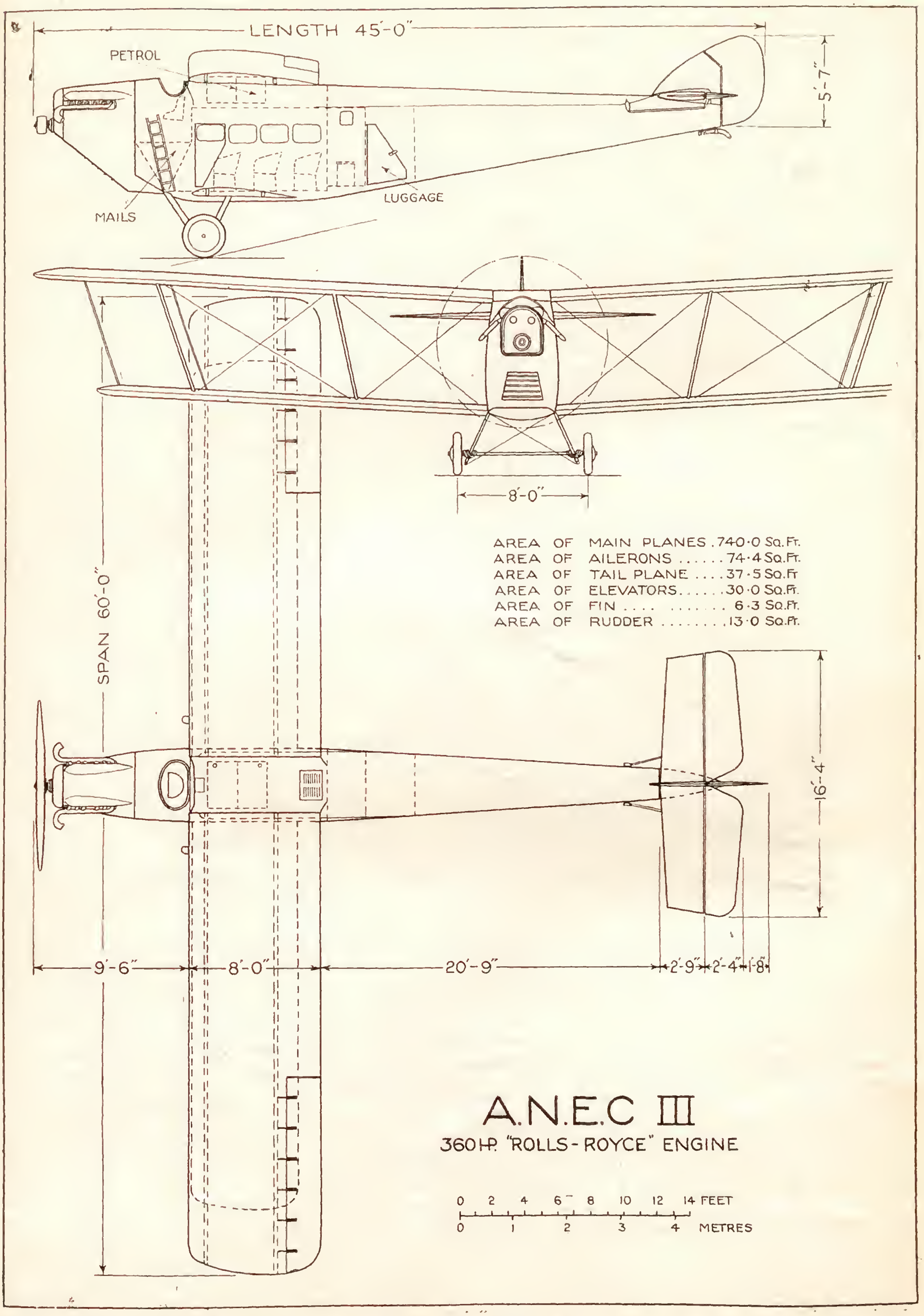

LENGTH 45'-0"
PETROL
5'-7"
LUGGAGE
MAILS
8'-0"
SPAN 60'-0"
AREA OF MAIN PLANES . 740·0 Sq.Ft.
AREA OF AILERONS . . . . . . 74·4 Sq.Ft.
AREA OF TAIL PLANE . . . . 37·5 Sq.Ft.
AREA OF ELEVATORS . . . . . . 30·0 Sq.Ft.
AREA OF FIN . . . . 6·3 Sq.Ft.
AREA OF RUDDER . . . . 13·0 Sq.Ft.
16'-4"
9'-6"
8'-0"
20'-9"
2'-9"
2'-4"
1'-8"
A.N.E.C III
360 H.P. "ROLLS-ROYCE" ENGINE
0 2 4 6 8 10 12 14 FEET
0 1 2 3 4 METRES

THE A.N.E.C. III COMMERCIAL AEROPLANE: General Arrangement Drawings, to Scale. The engine is a Rolls-Royce "Eagle IX." Three of these machines are being built for the Larkin Company of Australia.

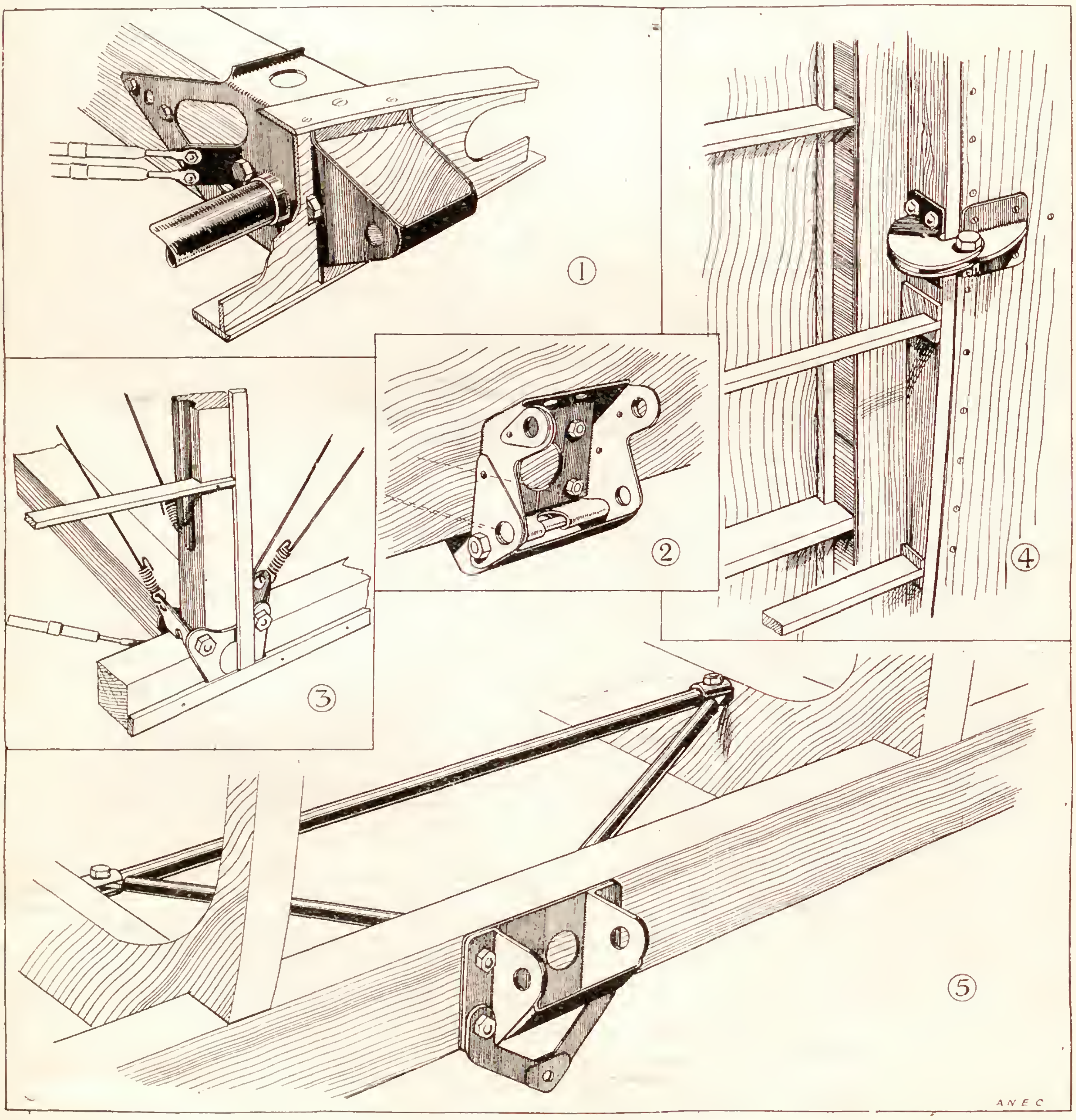
The pilot's cockpit is placed ahead of the wings, aft of the engine, and as the seat is raised, the view is excellent. The cabin has seating accommodation for six passengers only, but the machine is designed to carry a pay load of 1,200 lb. all told, which is really very good indeed, considering that its tank capacity is sufficient for 450 miles. The pay load with this range works out at 3·33 lb./h.p.

In the front part of the passenger saloon, partly under the pilot's cockpit, is the compartment for mails, while aft of the cabin is a lavatory, and behind that again a luggage compartment with its separate door.

The Rolls-Royce "Eagle IX" engine is mounted on steel tube bearers, resting on multi-plywood cradles, and the radiator is built into the engine housing below the engine, the shutters forming part of the bottom cowling. The petrol tanks are mounted in the top of the cabin, but the head is not quite sufficient for gravity feed, and a submerged petrol pump is employed, which takes its supply from the tanks by gravity and delivers under slight pressure to a small service tank. This arrangement should be practically as simple and reliable as direct gravity feed.

The undercarriage is of simple standard type with two vees and rubber cord shock absorbers.

The dimensions are shown on the general arrangement drawings. Following are the main characteristics of the A.N.E.C. III.: Weight, empty, 3,470 lb. Total loaded weight, 5,600 lb. The load is made up of 90 gallons of petrol, 10 gallons of oil, pilot, and six passengers, the pay load being as already stated, 1,200 lb. The estimated top speed is 105 m.p.h., and the cruising speed at 3,000 ft. 90 m.p.h., while it is hoped the landing speed will be as low as 49 m.p.h. The estimated ceiling is 14,500 ft., and it is calculated that the climb to 3,000 ft. will occupy 5¼ minutes. The A.N.E.C. III is expected to be ready for flying tests in about a fortnight, when we hope to give photographs of the machine on the ground and in flight.



THE ANEC III—SOME CONSTRUCTIONAL DETAILS: 1 shows the spar root fitting on the lower rear spar, while the attachment to the fuselage is shown in 2. Steel straps run under the fuselage to transmit the pull of the lift wires. In 3 is shown a typical fuselage joint aft of the luggage compartment. A luggage compartment hinge is illustrated in 4, which also shows the wood construction. The front spar of the lower plane is attached to the fuselage by the fitting shown in 5, and it should be noted that steel tubes are employed to transmit the loads to the two bulkheads or formers of the cabin.

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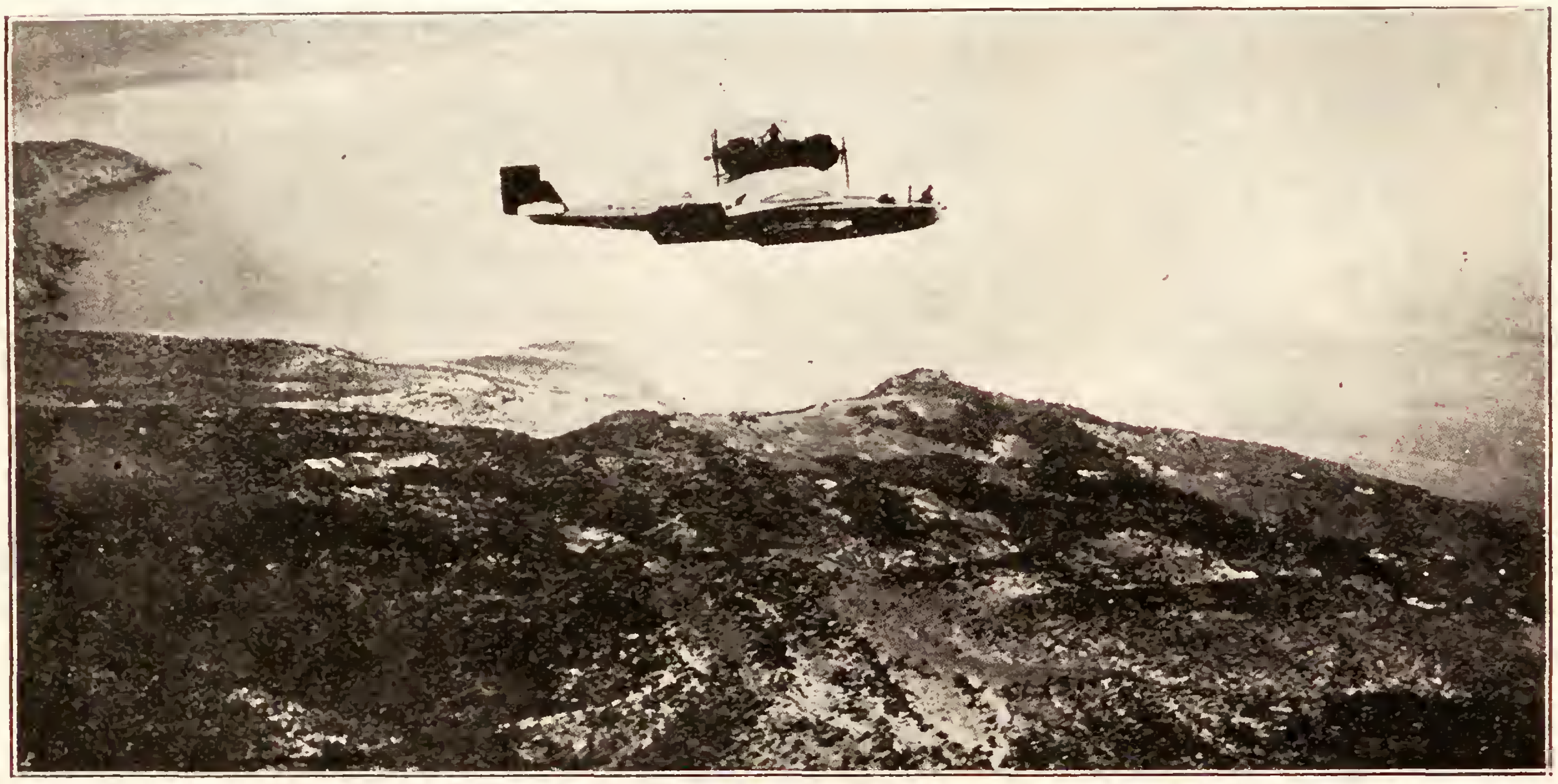
Was used by Commandante Franco on the Dornier-Wal-Napier Flight from Spain to South America.



THE DORNIER-WAL-NAPIER IN FLIGHT.

TESTIMONIAL to TITANINE.

Messrs, Titanine. Marina di Pisa, 1st Feb., 1926.
Dear Sirs,

We have much pleasure in expressing our complete satisfaction in the use of "Titanine" varnishes.

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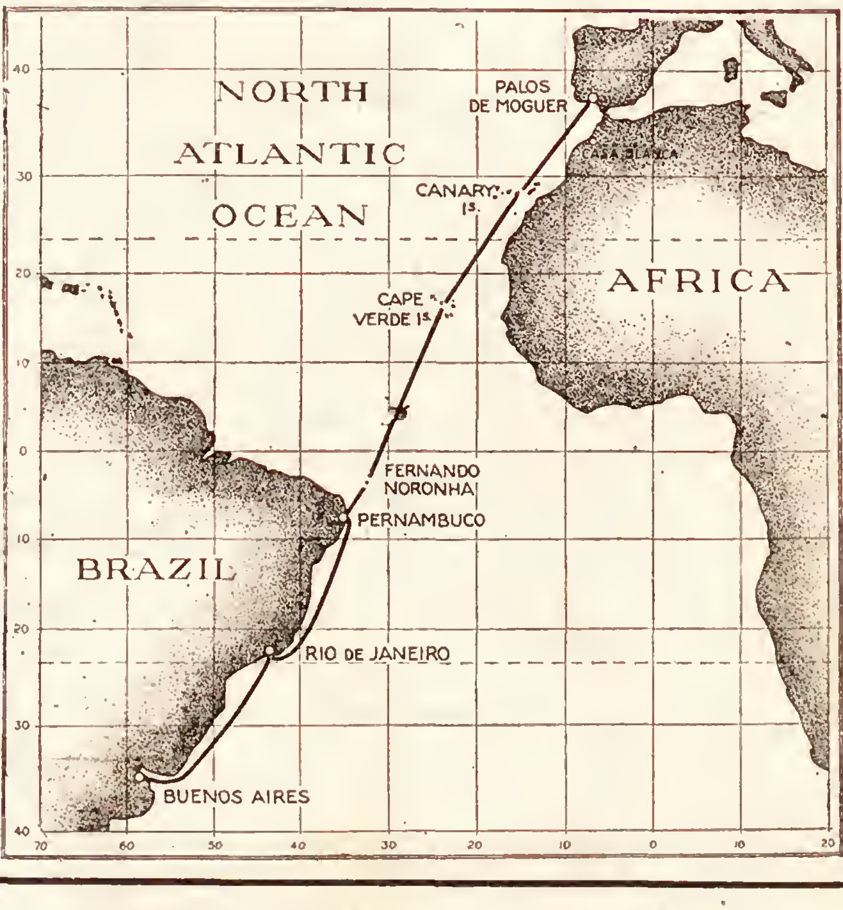
Our machines varnished with Titanine, are in service in Morocco where they have participated in various war engagements, satisfactorily resisting the African climate; for many months they were moored in the open, there not being sufficient room in the hangars.

The Dornier-Wal-Napier machine with which Commander FRANCO has accomplished his crossing of the Atlantic, is coated with Titanine.

The machines supplied to the Societa Anonima Navigazione Aerea for the line Genova-Rome-Napoli-Palermo are also coated with Titanine. It is anticipated that during their service they will remain always in the open, there being no sheds at the main stations of the line at Genova and Palermo.

With kind regards,
CONSTRUZIONI MECCANICHE AEREONAUTICHE S.A.
Stabilimento di Marina di Pisa.
(signed) Guidi.



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The Editor does not hold himself responsible for opinions expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters intended for insertion in these columns.

THE AIRCRAFT ENGINEER

[2117] I must congratulate FLIGHT on the inauguration of the series of monthly technical supplements. I feel that they will be extremely useful, and will lead to an interchange of views which are unobtainable by any other method.

I am interested in Mr. Short's article on Duralumin as a material for aircraft construction, and consider that he has obtained some excellent results. I should like, if possible, some information as to how this form of construction compares in use under service conditions with steel and timber construction.

T. O. M. SOPWITH

Kingston-on-Thames,
February 3, 1926.

[2118] Please allow me to congratulate you on the issue of FLIGHT containing the first monthly *Aircraft Engineer* supplement. If articles of such general interest can be maintained, there is little likelihood of this new section being skipped even by your non-technical readers

I was specially interested in Mr. Short's article on the Duralumin construction of aircraft, and agree that the formidable word "corrosion" has had a good deal to do with retarding the development of light alloy construction in this country. One unconsciously thinks of mere rust as something which can be removed with a bit of emery paper, whereas with corrosion, which is precisely the same thing, one equally unconsciously thinks of some hopeless and obscure disease in the metal.

Several secret and semi-secret processes have been devised enabling Duralumin to be satisfactorily protected against corrosion. With one of these it is even possible to treat the internal walls of a 20-ft. length of pitot piping. There are also several effective varnishes and enamels which render Duralumin at least as resistant under service conditions as the usual high-tensile steels. One or two simple rules require to be borne in mind. It is important that the Duralumin used should be of precisely the same composition throughout the structure even to the rivets, and that other metals, with the exception of steel, should only be mixed in the structure under certain conditions.

W. S. SHACKLETON

Dalmuir,
February 3, 1296.

[2119] May I congratulate you on your enterprise in adding to your already interesting journal the monthly Technical Supplement, entitled *The Aircraft Engineer*. On reading the first of these supplements in your issue of January 28 last one is struck with the fact that it has led to an interesting exchange of ideas between the exponents of different methods of aircraft design and manufacture. It is not often that one gets, in a single issue of a journal, such viewpoints of a subject for direct comparison. The principle, perhaps, is worthy of development.

There are one or two points in Maj. Green's article on "Steel Construction for Metal Aircraft" which I venture to make some comments upon. The first is in regard to the question of home supplies of raw material. So far as the supply of raw material for the manufacture of aluminium alloy is concerned, it must be admitted that at present such supplies come from abroad, but so do many other important products which are necessities in time of war. Bauxite, which is the raw material of aluminium, can be obtained from several of the British Colonies, such as British Guiana, India and the Gold Coast, and in a great emergency I am informed that there are supplies in Northern Ireland, which can be utilised at an increased cost of manufacture. Competitive prices in peace times are such as to make the Northern Ireland deposits too expensive for ordinary commercial work. There should be no difficulty, however, in keeping a sufficient stock of material in hand for war emergency as must be done with other vital materials which have to come from overseas, such as spruce, hitherto the main material for the manufacture of aircraft.

The other point is Maj. Green's figure for the maximum stress of Duralumin, which he places at 14·5 tons per sq. in., admitting it is a low figure. As a matter of fact there is no reason to doubt that a figure of about 24 per cent. greater can be obtained, at least that is our experience. This would make the relative specific strength of Duralumin almost equal to steel as given in Maj. Green's table. Finally, so far as confidence in the reliability of different metals is concerned, it is a matter of experience and usage, and Duralumin has now a good foundation to rest upon in this respect. It is notable that the German aircraft constructors still continue to use it after some 15 years' experience of its qualities.

London, February 8, 1926 OSWALD SHORT

Apart from the above letters, which contribute to the discussion of the articles published in the first *Aircraft Engineer* Supplement, a very large number of letters have been received from readers expressing appreciation of our new technical section, in which, we are glad to say, there appears to be a general and widespread interest. Following are extracts of some of the many letters of this nature which have reached us:—

Capt. G. de Havilland: "I think the new move is a really good one, and I hope it will prosper. I believe it will."

Mr. C. C. Walker (The De Havilland Aircraft Co.): "I should like to congratulate you on the first number of *The Aircraft Engineer*, which I think is full of promise."

Mr. C. H. Dowty: "I wish to tell you how much I appreciate the current issue of FLIGHT. There has been a great lack of technical articles in the aircraft weeklies, and these will fill a long-felt want."

Mr. H. P. Folland (The Gloucestershire Aircraft Co.): "I should like to mention that your scheme is a most excellent one, and greatly adds to the value of your paper, and I myself fully appreciate the articles which have been written."

Mr. F. Sigrist (The Hawker Engineering Co.): "I must say that I consider the Supplement under the title *The Aircraft Engineer* is a welcome innovation, and one which should do much to stimulate interest."

Mr. W. O. Manning (English Electric Co.): "I consider that FLIGHT is to be congratulated on the new Supplement, *The Aircraft Engineer*, and especially on the very excellent articles with which this new feature has been inaugurated."

Capt. A. S. Keep (Westland Aircraft Works): "I was very interested in the excellent articles in *The Aircraft Engineer*, which contained a good deal of useful information from well-known authorities. If you can continue the Supplement on the same lines as you have started, it should be a very welcome feature."

PRIVATE FLYING

[2120] I am sending you herewith a copy of a communication I am issuing relating to private flying, together with Air Ministry Notice to Airmen No. 56 (published in FLIGHT, p. 657, October 8, 1925), and also proposed amendments put forward by the Air Ministry.

HAROLD E. PERRIN, *Secretary, R.Ae.Club.*

Royal Aero Club,
February 8, 1926.

[Enclosures]

Private Flying

The Royal Aero Club has appointed a committee to study the conditions and regulations governing private flying, and to consider whether any, and if so, what changes should be made with a view to its furtherance.

I enclose herewith Air Ministry Notice to Airmen No. 56 of 1925. and also a copy of the proposed amendments to Regulations governing private flying which has been received from the Air Ministry.

Air Ministry Notice No. 56 deals with:—I. The issue of a licence to a pilot and regulations connected therewith. II. The renewal of licences. III. The conditions governing flight within Great Britain and Northern Ireland, wherein the question of the registration and Certificate of airworthiness for aircraft are dealt with, as well as the prescribed documents that have to be carried.

The proposed amendments deal with the same subjects, as follows:—I and II. *Issue and Renewal of Licences.* (See *para.* 5 of the Air Ministry proposals. III. *Flights within Great Britain and Ireland.* (See *para.* 3 of the proposals with regard to Certificate of Airworthiness.) *Para.* 4 with regard to examination before flight. *Para.* 6 with regard to the investigation of accidents.

The following points are suggested for your consideration with regard to the two documents enclosed:—(1) *I and II. Issue and Renewal of Licences. Paras.* 1 *to* 9 *of Air Ministry Notice No.* 56. *Paras.* 5 *and* 6 *of the Air Ministry Proposals.*

The Committee would draw attention to the fact that the medical examination under this licence is carried out by the applicant's usual medical attendant, and is on the same lines as that of an ordinary life insurance medical examination. The Air Ministry do not contemplate any alteration in this, and the Committee are disposed to agree.

(2) *Regulation* 3 *of Air Ministry Notice No.* 56 calls for the candidate to pass a technical examination. Do you consider that the technical examination should be simplified ?

(3) *Certificates of Airworthiness. Air Ministry Notice No.* 56, *para.* 12. *Proposed Amendments, para.* 3.

The Committee would welcome an expression of opinion as to whether you consider it necessary that the aircraft should be furnished with a Certificate of Airworthiness granted by the Air Ministry, or whether the certificate should be issued by the constructing firm if the latter were on an approved Air Ministry list. It is desired to have evidence as to whether this alteration would lead to a cheapening in the cost of aircraft construction.

(4) *Air Ministry Notice No.* 56, *para.* 12. *Air Ministry Proposed Amendments, para.* 4.

The Committee desire to know whether it is considered necessary to have the examination referred to. Consideration should be given to the fact that a machine might not always operate from an aerodrome at which examination facilities are available. Should you support the view that a Certificate of Airworthiness should be granted by the constructing firm, your views would be appreciated on the subject of inspection of the aircraft thereafter. At the present time the ground engineer who inspects is licensed by and is responsible to the Air Ministry, to see that the standard of workmanship, etc., called for in the Certificate of Airworthiness is maintained thereafter. It has been suggested that if the constructing firm grant the Certificate of Airworthiness the subsequent inspection of the aircraft after a period of flying (say 50 hours) or storage, or after an aircraft is overhauled or repaired or when any part of it has been replaced, could be carried out by the constructing firm's representative.

(5) *Prescribed Documents. Air Ministry Notice No.* 56, *Para.* 13.—The Committee consider that 1, 2 and 3 are necessary. Your views are asked as to (1) whether the existing Journey Log Book should be retained or (2) whether it should be replaced in a simplified form, showing the hours flown, certified by the pilot, and (3) whether this document should remain in the custody of the owner or be carried on the aircraft.

Investigation of Accidents. Air Ministry Proposed Amendments—Para. 6.—As regards private flying, the Committee suggest that the Royal Aero Club should receive a copy of the report on the accident, and have the right to nominate a representative to sit on the Investigation Committee. Please state your views.

Insurance.—The Committee suggests that where machines are privately owned, the owner should be compelled by law to insure against Third Party Risks. Please state your views.

The Committee would welcome an expression of your views on these memorandums as well as any further comments you may wish to put forward on the subject of Private Flying. It is the desire of the Committee to put forward to the Air Ministry such recommendations as will facilitate the development of private flying in its widest sense.

It will greatly assist the Committee if your reply is sent in not later than the 17th inst.

Air Ministry Memorandum

Proposed Amendment of Regulations Governing Private Flying.

1. The Air Ministry have had under consideration as a result of various representations, the application of the Air Navigation Orders and Directions to private aircraft, *i.e.*, aircraft not carrying passengers or goods for hire or reward.

2. This consideration has had in view more particularly the possibility of relaxing, in the interests of owners of private aircraft, the regulations with regard to the Certificate of Airworthiness of the aircraft, the Pilot's Licence and the investigation into aircraft accidents.

3. *Certificate of Airworthiness.*—By Article 11 of the Convention for the Regulation of Aerial Navigation (Paris, October 13, 1919) :

> " Every aircraft engaged in international navigation shall, in accordance with the conditions laid down in Annex B, be provided with a Certificate of Airworthiness issued or rendered valid by the State whose nationality it possesses "

and the International Commission for Air Navigation, set up by the Convention, has been studying the international minimum standard conditions which an aircraft must satisfy before a Certificate of Airworthiness can be issued.

It will be noted that under the Convention the obligation with regard to Certificates of Airworthiness only affects aircraft engaged in international navigation, but with the authority of Section 2 of the Air Navigation Act, 1920, the policy of the Air Ministry has been to forbid the flight of all aircraft not possessing a Certificate of Airworthiness, except (*a*) in the case of aircraft flown within three miles of an aerodrome for the purpose of experiment or test only, or (*b*) by special permission of the Secretary of State in writing, and the Air Navigation Orders have been drawn up accordingly

It is possible to alter this policy by an amendment of the Air Navigation Orders and without any alteration of the Act so that the regulation applies only to aircraft carrying passengers or goods for hire or reward or engaged in international navigation, and so that private aircraft flown in this country are exempted from the requirement to have a Certificate of Airworthiness.

An amendment of the Order in this sense is under consideration by the Air Ministry.

In connection with any discussion on the subject the advantages gained in the direction of encouraging an increase in private flying by this removal of administrative restrictions should be balanced against the possible effect that such a change might have both on the reputation for safety enjoyed by British aircraft at home and abroad, as a result of the high standards demanded before a Certificate of Airworthiness is granted and also on the insurance rates. Moreover, attention should be called to the possible increase in third party risks, and in this connection Section 9 (1) of the Air Navigation Act should not be forgotten by which proof of negligence is not required in the case of material damage or loss caused by an aircraft when in flight or on landing or taking off.

4. *Examination before Flight.*—As there is some misunderstanding on the subject it may be worth while placing on record here that aircraft not carrying passengers or goods for hire or reward are not required by the Air Navigation Orders to be examined before flight by a certified ground engineer.

As the directions stand at present, however, the regulation requires that when an aircraft is overhauled or repaired, or when any part of it has been replaced, it shall be examined and certified by a ground engineer before it flies again.

The Air Ministry have under consideration the abolition of this regulation in so far as private aircraft are concerned.

5. *Private Pilot's Licence.*—Under Article 12 of the International Air Convention :—

> " The Commanding Officer, pilots, engineers and other members of the operating crew of every aircraft shall, in accordance with the conditions laid down in Annex E, be provided with certificates of competency and licences issued or rendered valid by the State whose nationality the aircraft possesses."

It will be noted that whereas under the International Air Convention, certificates of airworthiness are only required for aircraft engaged in international navigation, all pilots and members of the operating crews, whether the aircraft on which they are employed are engaged in international navigation or not, must be provided with certificates of competency and licences.

The minimum qualifications necessary for obtaining a Private Pilot's Licence are set out in detail in Annex E of the International Air Convention and are reproduced in the Air Navigation Regulations. These qualifications, as they are contained in an Annex to the Convention and not in the Articles of the Convention itself, can be amended from time to time by the International Commission. In this connection, on representations made by the Light Aeroplane Clubs, the British Delegation to the Commission are proposing that the altitude test which requires at present that " the pilot shall remain for at least an hour at a minimum altitude of 2,000 metres above the point of departure " shall be amended so as to read " the pilot shall attain a minimum altitude of 2,000 metres above the point of departure." This proposal will be discussed at the next meeting of the Commission to be held in Paris in April, and if adopted, the Air Navigation Directions will be amended accordingly. Apart from this, the Air Ministry are not proposing any amendments with regard to the conditions for the issue or renewal of a Private Pilot's Licence.

It must be remembered that incompetency on the part of a pilot or ignorance of the rules of the air is a source of danger to other pilots and aircraft.

With regard to the medical examination required in the case of private pilots, the minimum standards are laid down in Annex E of the Convention, but each contracting State is at liberty to fix its own methods of examination and to raise the conditions if it so desires. The international

R. M. KINDERMAN
COLLECTION

standard which is the one adopted in this country, is not unduly high, and in accordance with the Air Navigation Directions (A.N.D.3.D.) the medical examination for the issue and for the renewal of the Private Pilot's licence can be conducted by the applicant's usual medical attendant, who submits his report to the Air Ministry.

The Air Ministry do not at present contemplate any alteration in the arrangements for the medical examination of applicants for Private Pilots' licences.

6. *Investigation of Accidents.*—Under the Air Navigation (Investigation of Accidents) Regulations, 1922, notification of accidents is required in the case of death or personal injury to any person, whether carried in the aircraft or not, and in the case of serious structural damage to the aircraft.

On notification of the accident being received, the decision as to whether a preliminary investigation into the cause of the accident is necessary or not must rest with the Inspector of Accidents, but if he is satisfied that an investigation is unnecessary, the owner of the aircraft will receive permission at once to remove the aircraft.

THE ROYAL AIR FORCE

London Gazette, January 26, 1925

Stores Branch

Flying Officer C. B. Horsfield is confirmed in his appointment in the Stores Branch and is granted a permanent commn.; Jan. 14. Flying Officer B. W. Hemsley is granted a permanent commn. in rank stated; Jan. 27.

Accountant Branch.

The following Flying Officers are granted permanent commns. in rank stated :—F. C. Chalmers, G. W. Lynn; Jan. 27. Pilot Officer on probation A. E. West is confirmed in rank and promoted to rank of Flying Officer, with effect from Dec. 3, 1925, and with seny. of Nov. 10, 1925.

Medical Branch

L. I. Hyder is granted a short-service commn. as a Flying Officer for three years on Active List, with effect from and with seny. of Jan. 6. Flying Officer S. G. Gilmore is promoted to rank of Flight-Lieut.; Jan. 23. Flying Officer T. Glynn, M.B., is transferred to Reserve, Class D.2; Jan. 23.

Memorandum

181322 Cadet T. Smith is granted an hon. commn. as a Sec. Lieut., with effect from the date of his demobilisation.

Reserve of Air Force Officers

L. R. Tait-Cox is granted a commn. in Class A, General Duties Branch, as a Flying Officer on probation; Jan. 26. The following are granted commns. in Class AA, General Duties Branch, as Pilot Officers on probation :—W. J. Overy, C. E. F. Riley; Jan. 11. J. R. W. Alexander; Jan. 13. Flight-Lieut. F. F. Minchin, C.B.E., D.S.O., M.C., is promoted to the rank of Squadron-Leader; Jan. 26. The following Flying Officers are promoted to rank of Flight-Lieut. (Jan. 26) :—H. Wyllie, O.B.E. (and is granted the honorary rank of Wing Commander); R. H. Mayo, O.B.E.; H. A. Buss, O.B.E., D.S.C.

The following Pilot Officers are confirmed in their rank (Jan. 21) :—L. O. Moss, M.M.; H. A. Record.

London Gazette, February 2, 1926

General Duties Branch

Flight-Lieut. J. McFarlane, M.C., is granted a permanent commission in the rank stated; Jan. 1. The following are granted permanent commns, as Pilot Officers, with effect from the dates indicated, and with seniority of the dates stated in brackets :—J. A. Tindall; Jan. 18 (Jan. 18, 1925). E. D. M. Hopkins; Jan. 26 (Jan. 26, 1925). The following are granted short service commns., as Pilot Officers on probation, with effect from and with seniority of the dates indicated :—R. H. Donkin; Jan. 22. S. H. C. Gray; Jan. 23.

The following Pilot Officers are promoted to rank of Flying Officers :—F. W. Moxham; Sept. 14, 1925. R. H. Barlow; Jan. 31. Pilot Officer on probation H. A. M. Weir is confirmed in rank; Oct. 1, 1925. Flying Officer E. N. T. Edwards (Lieut., R.A.), is re-seconded for two years' duty with the R.A.F.; Aug. 1, 1925. Flight-Lieut. W. H. Mackenzie, A.F.C., is placed on retired list at his own request, and is granted rank of Sqdn. Leader; Feb. 3. Flight-Lieut. W. T. S. Williams, D.S.C., is placed on the retired list on account of ill-health; Feb. 3. Flying Officer C. R. Stewart is transfd. to Reserve, Class A; Feb. 2. Wing Commander J. P. C. Sewell, O.B.E., is transfd. to Reserve, Class C; Dec. 5, 1925. (Substituted for *Gazette* Dec. 8, 1925.)

The following relinquish their short service commns. on account of ill-health, Feb. 3: Flying Officer C. Wilson, Pilot Officer on probation H. W. Miller. C. F. L. Holford, Lieut., R.M., Flying Officer, R.A.F., relinquishes his temp. commn. on return to the Royal Marines; Jan. 21. (Substituted for *Gazette*, Jan. 26.)

Accountant Branch

The following Flying Officers are granted permanent commns. in rank stated Feb. 3: F. R. Barton, R. G. Dyer.

Medical Branch

C. J. S. O'Malley is granted a short service commn., as a Flying Officer, for three years on Active List, with effect from and with seniority of Jan. 14; N. I. Smith, M.B. (Capt., R.A., T.A.), is granted a short service commn., as a Flying Officer, for three years on Active List, with effect from and with seniority of Jan. 25, and is seconded for employment at King's Cross Hospital, Dundee, with effect from that date. Flight Lieut. T. L. P. Harries, M.B., is transfd. to Reserve, Class D.2; Jan. 30.

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified :—

General Duties Branch.

Wing Commanders: L. A. Pattinson, D.S.O., M.C., D.F.C., to Station H.Q., Andover, to command, 12.2.26. H. L. Reilly, D.S.O., to H.Q., Iraq, for Air Staff (Signals) duties, 31.12.25.

Squadron Leaders: H. E. M. Watkins, A.F.C., R.D., to R.A.F. Training Base, Leuchars, 3.2.26. J. B. Graham, M.C., A.F.C., to No. 207 Sqdn., Eastchurch, 20.1.26. A. L. Gregory, M.B.E., M.C., to Special Duty List, for duty as Head of No. 10 Section, R.A.E., S. Farnborough, 5.2.26. H. M. Probyn, D.S.O., to Sch. of Army Co-operation, Old Sarum, 4.2.26. A. H. Stradling, O.B.E., to Station Commandant, Hinaidi, 1.1.26. J. C. P. Wood to No. 4 Flying Training Sch., Egypt, 12.12.25. A. Durston, A.F.C., to No. 480 Flight, Calshot, 18.1.26.

Flight Lieutenants: R. A. Courtney, M.B.E., to No. 3 Group, H.Q., Spittlegate, 9.2.26. H. C. Calvey, to No. 23 Sqdn., Henlow, 20.1.26. C. A. Bouchier, D.F.C., to No. 41 Sqdn., Northolt, 20.1.26. H. E. Searle, to No. 32 Sqdn., Kenley, 18.1.26. A. J. E. Broomfield, D.F.C., to Aircraft Depot, India, 17.12.25. B. A. Malet, D.F.C., to H.M.S. "Eagle" 27.1.26. W. G. Preston, D.F.C., to No. 100 Sqdn., Spittlegate, 28.1.26. S. P. Simpson, to H.Q., Egypt, 4.1.26. A. H. Goldie, to No. 4 Flying Training Sch., Egypt, 8.1.26. S. F. Vincent, A.F.C., to Heliopolis Details, Egypt, 12.12.25. N. P. Dixon, A.F.C., to Station Commandant, Hinaidi, 8.1.26. C. Chapman, D.S.C., to No. 14 Sqdn., Palestine, 20.12.25. H. L. P. Lester, to No. 4 Flying Training Sch., Egypt, 21.12.25. J. G. S. Candy, D.F.C., to Station Commandant, Basrah, 5.1.26. A. R. Churchman, D.F.C., to H.Q., Palestine, 12.12.25. W. A. Duncan, to H.Q., Iraq, 1.1.26. F. Thomasson, D.F.C., M.M., to No. 6 Sqdn., Iraq., 1.1.26. L. Eardley-Wilmot, to H.Q., Egypt, 9.1.26.

Flying Officers: N. S. Paynter to No. 60 Sqdn., India, instead of to Aircraft Depot, as previously notified, 18.11.25. B. H. C. Russell to No. 5 Sqdn., India, instead of to No. 20 Sqdn., as previously notified, 18.11.25. D. C. Prance, to Aircraft Depot, India, instead of to No. 60 Sqdn., as previously notified, 18.11.25. L. W. Lane, M.C., to Aircraft Park, India, 11.12.25. W. J. M. Akerman, to No. 28 Sqdn., India, instead of to No. 31 Sqdn., as previously notified ,18.11.25. A. B. Smith, M.C., to No. 20 Sqdn., India, instead of to No. 31 Sqdn., as previously notified, 18.11.25. G. I. C. Peacocke, to Aircraft Depot, India, instead of to No. 27 Sqdn., as previously notified, 18.11.25. A. D. Davies to Aircraft Depot, India, instead of to No. 31 Sqdn., as previously notified, 18.11.25. F. V. Beamish to No. 31 Sqdn., India, instead of to No. 5 Sqdn. as previously notified, 18.11.25. E. C. de V. Lart, to No. 60 Sqdn., India, instead of to No. 27 Sqdn., as previously notified, 18.11.25. A. F. Hutton to Aircraft Depot, India, instead of to No. 5 Sqdn., as previously notified, 18.11.25. G. W. P. Irwin to Aircraft Depot, India, instead of to No. 31 Sqdn., as previously notified, 18.11.25. J. C. Marey to Aircraft Depot, India, instead of to No. 5 Sqdn. as previosuly notified, 18.11.25. D. Robinson to Aircraft Depot, India, instead of to No. 5 Sqdn., as previously notified. 18.11.25. F. T. Eades, D.F.C., to No. 58 Sqdn., Worthy Down, on transfer to Home Estab., 7.1.26. W. S. Allen to Station H.Q., Northolt, 5.2.26. W. R. Heywood to No. 1 Stores Depot, Kidbrooke, 4.2.26. Hon. Flt. Lt. G. N. Carroll to R.A.F. Base, Calshot, 8.2.26. N. H. F. Unwin, to Sch. of Tech. Training (Men), Manston, 8.2.26. C. O. Towler, D.S.M., to H.Q., Mediterranean, 12.12.25. T. Sullivan, to H.Q., Palestine, 12.12.25. J. W, Rose, D.S.M., to No. 208 Sqdn., Egypt, 19.12.25. A. E. Conolly to H.Q.; Iraq., 1.1.26. R. B. H. Jackson, to No. 30 Sqdn., Iraq, 29.12.25. F. E. C. Benstead to Inland Water Transport, Iraq, 8.1.26. D. C. Prance to No. 20 Sqdn., India, 6.1.26. J. S. Phillips to No. 4 Flying Training Sch., Egypt, 12.12.25. R. A. King to No. 5 Sqdn., India, 28.11.25. C. Snow to R.A.F. Reception Depot, West Drayton, 3.2.26.

Pilot Officers: H. D. Gunton to No. 2 Flying Training Sch., Digby, 30.1.26. W. E. Symonds, to No. 216 Sqdn., Egypt, 7.1.26.

Stores Branch.

Flight-Lieutenants: P. F. Connaughton and P. J. Murphy, to H.Q., Iraq; 15.1.26.

Flight Lieutenants: A. M. Saywood, to H.Q., Iraq, 1.1.26. J. Walker to Heliopolis Details, Egypt, 12.12.25. F. Petch, O.B.E., to H.M.S. "Eagle," 28.1.26.

Flying Officers: E. F. Elliott and G. W. Longstaff, to H.Q., Iraq; 15.1.26. A. Walters, to R.A.F. Depot, on transfer to Home Estab.; 10.1.26.

Flying Officers: S. R. L. Poole, to No. 3 Wing, H.Q., India, instead of to Aircraft Depot as previously notified, 18.11.25. G. C. Wilson to No. 208 Sqdn., Egypt, 12.12.25.

Accountant Branch.

Wing Commander H. G. Jones, to H.Q., Cranwell, for duty as Command Accountant, 8.2.26.

Flight Lieutenants: P. Hay, M.C., to No. 216 Sqdn., Egypt, 11.12.25. J. H. B. Carson to R.A.F. Base, Malta, 12.12.25.

Flying Officers: C. W. Price to H.Q., Egypt, 5.1.26., D. F. A. Clarke, to No. 4 Flying Training Sch., Egypt, 5.1.26.

Pilot Officers: D. C. Stone, to No. 11 Sqdn., Netheravon; 21.1.26. C. L. Dook, to No. 2 Sqdn., Manston; 21.1.26. J. P. Cave, to Central Flying Sch. Upavon; 21.1.26. D. Sender, to No. 19 Sqdn., Duxford; 21.1.26. J. A.. Stephenson, to Armament and Gunnery Sch., Eastchurch; 21.1.26. A. L., Derry, to No. 43 Sqdn., Henlow; 21.1.26. W. F. Quilliam, to No. 3 Sqdn., Upavon; 21.1.26. H. Crowther, to No. 23 Sqdn., Henlow; 21.1.26. H. R. Withers, to R.A.F. Depot; 21.1.26. A. E. Fairs, M.C., to Sch. of Army Co-operation, Old Sarum; 21.1.26. K. A. Jackman, to Electrical and Wireless Sch., Flowerdon; 21.1.26. J. Lambio, to Sch. of Photography, S. Farnborough; 21.1.26. R. Cassels, to No. 100 Sqdn. Spittlegate; 21.1.26.

Legal Branch.

Flight Lieutenant G. S. Marshall, O.B.E., to Special Duty List, on appointment to a Temp. Commission for legal duties in Department of J. A. G. 14.12.25.

AUXILIARY AIR FORCE

General Duties Branch

The following to be Flying Officer :—No. 603 (City of Edinburgh) Bombing Squadron :—W. O. B. Winkler; Feb. 2.

IRISH AIR FORCE U.S.A. FLIGHT CANCELLED

In the Saorstat Dail (Free State Parliament), on January 27, the Minister for Defence, in reply to a question by Mr. Thomas Johnston, the leader of the Labour Party, stated that the proposed transatlantic flight by Irish Army airmen has been indefinitely postponed. The project was not abandoned, but the time was not yet ripe for such a trip.

In consequence of this ambiguous answer, it is to be expected that the matter will later on come up for consideration, and there is little reason to expect that the plans prepared will be dropped. Rather one has reason to hope that they will be developed so that when the opportunity comes for the carrying out of this scheme all the preliminaries will be cut and dried.

The original plan for a direct non-stop flight to New York was subsequently modified to include a halt at St. John's, Newfoundland. Col. Russell, Commandant of the Saorstat Air Force, has recently returned from London where he was in consultation with the British Air Force authorities in reference to the project. Up to the end of last month negotiations were in progress concerning the aircraft, etc., and preparations for the flight were well under way.

It is considered that the proposal should receive very mature consideration. The transatlantic trip was discussed at a recent conference at Government Buildings, and was attended by representatives of the Departments of Defence and Finance, and notable Army officers were present, and it is understood that the decision arrived at was that the time was not opportune for such a flight.

Needless to say, the decision spells grievous disappointment to those engaged in aeronautical circles in Ireland, but it is to be hoped that efforts to promote this scheme and bring it to fruition will not be relaxed.

⁂ ⁂ ⁂ ⁂

Royal Naval Air Service Dinner

It is proposed to hold a dinner on April 15, at the Victoria Hotel, Northumberland Avenue, at which Admiral of the Fleet, Viscount Jellicoe, O.M., G.C.V.O., R.N., has consented to preside, and Admiral Sir Richard Phillimore, K.C.B., G.C.M.G., R.N., will act as Vice-President. The Chairman of the Dinner Committee is Rear-Admiral Murray F. Sueter, C.B., M.P.

The guests of the evening will be the officers of the Fleet Air Arm, including the attached Royal Air Force officers. All officers who were attached to a Royal Naval Air Service unit during the war are eligible. Single tickets, 33*s.* each. Officers who are willing to entertain an officer of the Fleet Air Arm are invited to take an extra ticket. Combined tickets, 3 guineas. Applications for tickets, with cheque, should be sent to the Hon. Sec., R.N.A.S. Dinner, Royal United Service Institution, Whitehall, London, S.W.

Royal Aero Club Monthly House Dinner

The Fourth Monthly House Dinner will be held at the Royal Aero Club, on Wednesday, February 17, 1926, at 7.30 p.m. The subject for discussion will be "Private Flying." The number will be limited to sixty, and seats will be allotted in order of application. Apply, Secretary, Royal Aero Club.

Royal Aero Club Special Racing Fund, 1926

We give below a further list of donations for the R.Ae.C. Special Racing Fund (1926), which, it will be seen, is steadily growing.

Previously announced: £267 11*s.*; F. R. Simms, £2 2*s*; Lieut.-Col. J. Barrett Lennard, £5 5*s.*; C. H. Gray, £10; G. Gilman, £2; A. J. Wallace Barr, £10 10*s.*; H. D. Cutler, £2 2*s.*; R. L. Preston, £1 1*s.*; Seven Aeroplane Club, £5 5*s.* Total, £305 16*s.*

Institute of Aeronautical Engineers

An informal meeting of the Institute of Aeronautical Engineers will be held on Tuesday, February 23, and will take the form of a discussion on "Civil Aviation (Commercial)," opened by Mr. E. W. Parsons, Associate-member.

London-Cape Town Survey Flight

Alan Cobham has received another check on his flight from London to Cape Town, for on reaching Johannesburg, on February 5, Elliott (the engineer of the expedition) was struck with an attack of malaria, and had to be removed to hospital. As Cobham does not wish to complete the flight without him, this means a certain amount of delay. Fortunately Elliott's condition is not serious and it is reported that he is making a speedy recovery. When they left Pretoria on February 5, they were escorted to Johannesburg by six Union Air Force aeroplanes—on one occasion during the trip, Cobham leading the formation. Just before they landed the escorting machines "posed" for a film picture. At Johannesburg they were given a wonderful reception, and were later entertained at a civic luncheon. Cobham states that there is great enthusiasm for civil aviation in South Africa, and he has devoted a great deal of time during their stops in lecturing, etc., on the subject, so that British aviation propaganda is, therefore, being favoured by these delays.

At Buckingham Palace

At the Investiture held by His Majesty the King on February 4 at Buckingham Palace, the following were invested by the King with the Insignia of the respective Divisions of the Orders into which they have been admitted :—

Order of the Bath (Military Division)

Knight Commander: Air Vice-Marshal Sir Geoffrey Salmond.

Order of the British Empire (Military Division)

Commander: Wing-Commander Augustine Ap Ellis, R.A.F.

Distinguished Flying Cross

Flight-Lieutenant William Cumming, R.A.F.

Amongst those in attendance were Air Marshal Sir John Salmond (Principal Air Aide-de-Camp) and Group Captain L. W. B. Rees, V.C.

Bristol "Bloodhound" v. Charley's Aunt

Up to the time of writing the Bristol "Bloodhound," fitted with a sealed Bristol "Jupiter," is still attempting to catch up to Charley's Aunt, and continues to make faultless trips between Filton and Croydon. The hours of running and number of miles flown respectively are, so far, as follows: February 1, 86 hrs. 27 mins., 9,613 miles; February 2, 94 hrs. 8 mins., 10,470 miles; February 4, 99 hrs. 44 mins., 11,083 miles; February 5, 104 hrs. 53 mins., 11,643 miles; February 6, 109 hrs. 4 mins., 12,097 miles; February 8, 115 hrs. 18 mins., 12,782 miles. These tests started on January 4.

⁂ ⁂ ⁂ ⁂

PUBLICATIONS RECEIVED

Aeronautical Research Committee, Reports and Memoranda: No. 977 (*Ae.* 191).—An Experimental Investigation into the properties of Certain Framed Structures having Redundant Bracing Members. Report No. 3. By Prof. A. J. Sutton Pippard and G. H. W. Clifford. September, 1925. Price 6*d.* net.

No. 979 (*E.* 15).—Closed Vessel Explosions of Mixtures of Air and Liquid Fuel (Petrol, Hexane and Benzene). By R. W. Fenning. September, 1925. Price 2*s.* 6*d.* net. H.M. Stationery Office, Kingsway, London, W.C.2.

Canadian Patent Office Record. Vol. LIV. Nos. 1, 2, 3. *January* 5, 12 and 19, 1926. The Canadian Patent Office, Ottawa, Canada.

Official Gazette of the United States Patent Office. January 12, 1926. *Vol.* 342. *No.* 2. The United States Patent Office, Washington, D.C., U.S.A.

Caratteristiche Aerodinamiche di ali. Vol. IX. Allegato ai Rendiconti Tecnici del Ministero dell'Aeronautica. Ufficio di Stato Maggiore R. Aeronautica, Rome.

⁂ ⁂ ⁂ ⁂

AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations: Cyl. = cylinder; i.c. = internal combustion: m. = motor.
The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

APPLIED FOR IN 1924.

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17,367. J. I. Thornycroft and Co., Ltd., and Sir J. E. Thornycroft. Construction of ships for carrying aircraft. (245,808.)

30,873. I. Turner. Rotary engines. (245,924.)

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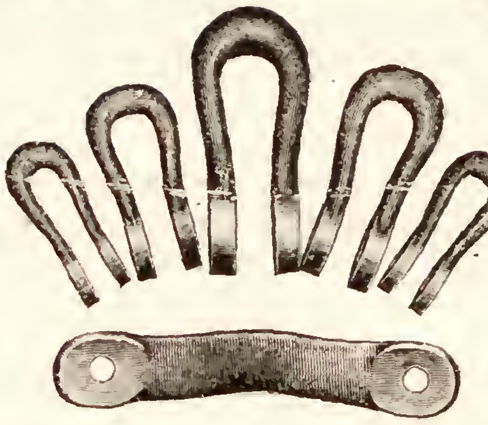

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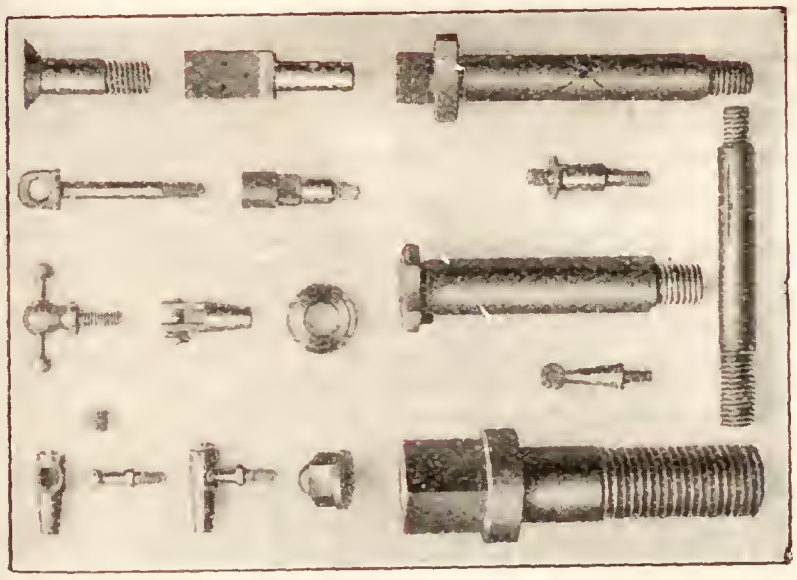

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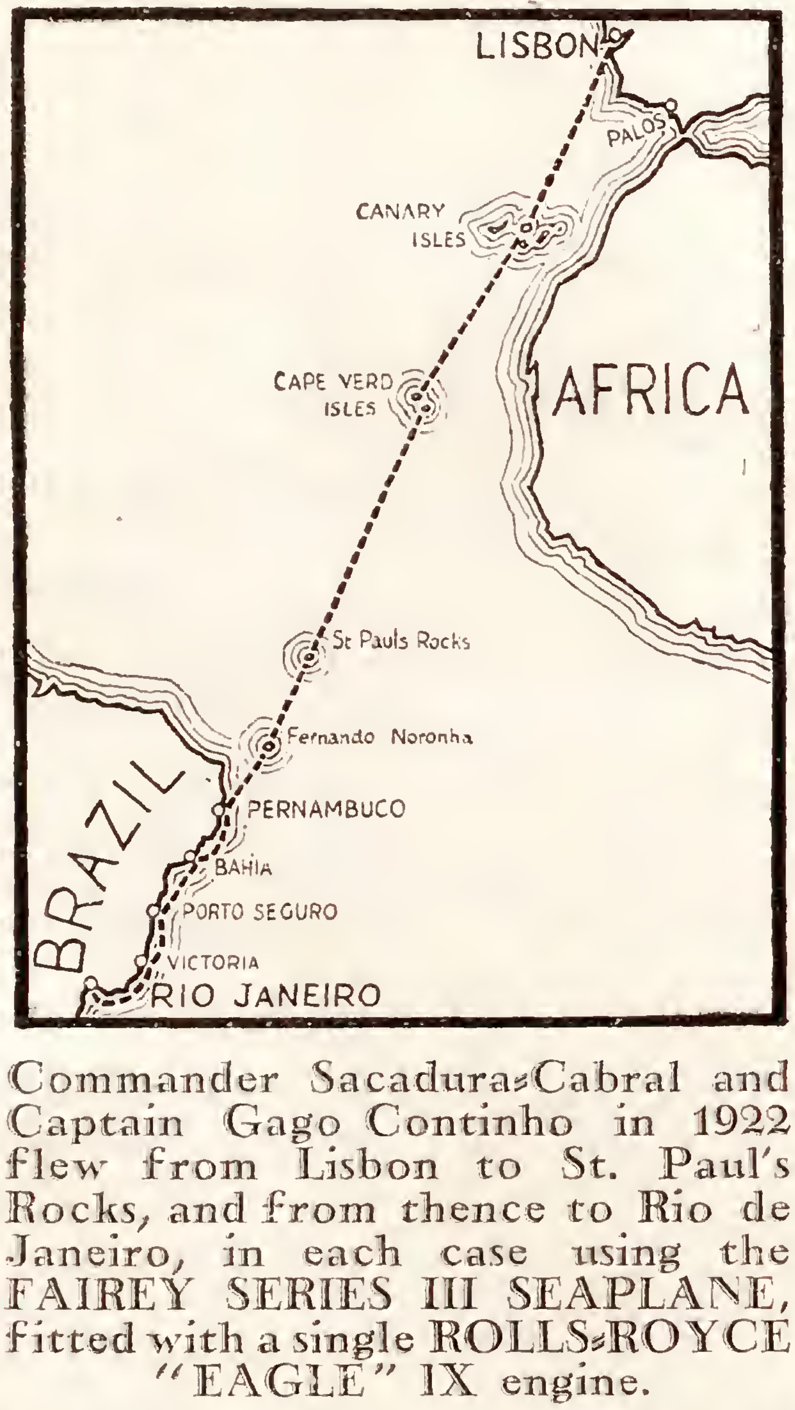

Commander Sacadura-Cabral and Captain Gago Continho in 1922 flew from Lisbon to St. Paul's Rocks, and from thence to Rio de Janeiro, in each case using the FAIREY SERIES III SEAPLANE, fitted with a single ROLLS-ROYCE "EAGLE" IX engine.

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CONTENTS

	PAGE
Editorial Comment	
Safety, Economy and Sports	85
Handley Page W. 10	87
Inter-Services Rugby Football	90
Correspondence	92
Royal Aero Club Official Notices	93
Light 'Plane Club Doings	93
Personals	94
Caproni "CA 70" Biplane	95
American Aeronautics	97
Royal Air Force	99
R.A.F. Intelligence	99
In Parliament	99
Air Post Stamps	100
Imports and Exports	100

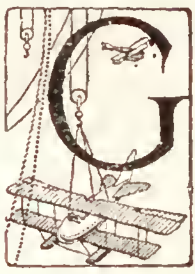
DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:—

1926	
Feb. 23	**Mr. E. W. Parsons, A.M.I.Ae.E. Discussion, "Civil Aviation," before Inst.Ae.E.**
Feb. 25	**Flight-Lieut. H. Cooch. "Landing Aeroplanes in Fog," before R.Ae.S.**
Mar. 4	**Maj. G. H. Scott. "Development of Airship Mooring," before R.Ae.S.**
Mar. 9	**Mr. O. E. Simmonds, M.A., A.F.R.Ae.S., M.I.Ae.E. "The Development of Civil Marine Aircraft," before Inst.Ae.E.**
Mar. 18	**Mr. A. J. Cobham. "Long-Distance Aeroplane Flights," before R.Ae.S.**
Mar. 22	**Entries close for Gordon Bennett Race.**
Mar. 31	**Entries close for Schneider Cup Race.**
April 13	**Mr. S. H. Evans, A.F.R.Ae.S., M.I.Ae.E. "The Performance of Modern Aircraft—with special reference to the Variable Wing," before Inst.Ae.E.**
April 15	**Capt. G. T. R. Hill. "The Tailless Aeroplane," before R.Ae.S.**
April 21	**Inst.Ae.E. visit to Messrs. D. Napier and Son, Acton.**

EDITORIAL COMMENT.

Safety, Economy and Sports



"GESTURE" is a word that has come to be used by modern politicians to cover all sorts of meanings, more often than not quite meaningless meanings, if we may be permitted the expression. A most unfortunate "gesture" was that of Sir Austen Chamberlain at the Civil Service dinner last week, when, on behalf of the Government, he announced that in fulfilment of a long-standing promise, he had been authorised to state that it had been decided to vote the Civil Service the sum of £200,000, to be devoted to the establishment of sports grounds for Civil Servants. "Provided, of course, that the House of Commons would agree." It would be difficult to imagine a more inopportune moment for such a "gesture," and, frankly, we believe that even the Civil Service itself would have been far more impressed had the Government chosen openly and frankly to state that, in spite of the promise made a year or so ago, under present conditions such an award could not be afforded.

We have heard a good deal of late about the sacrifices that we must be prepared to face, and the sweeping reductions in armaments which it is hoped to effect. The reasons given for the proposed reductions are partly the Locarno Treaty, and partly the urgent need for economy if British industry is to be put on its feet again. Concerning the former, it is early in the day yet to bank too much on the effect which the Locarno Treaty will have in other countries. Great Britain, after the war, or more specifically, after the Washington agreement, was the first to show her good faith by the most drastic reductions in her defence forces, Naval, Military and Air, and then it was discovered that certain other nations were not nearly so anxious to follow suit as had been expected. In other words, Great Britain's haste to do the right thing proved somewhat premature. Yet it would seem that the Government, like the Navy, forgets nothing and learns nothing.

As regards the section of our defence with which FLIGHT is most intimately concerned, our Air Forces, it is proposed to postpone the expansion that had been contemplated. The Locarno spirit is all very excellent in theory, and with goodwill on all sides it may become a practical factor for peace and disarmament. But the first move must be made by those possessing the stronger armaments, and not by the weaker nations. And, unfortunately, Great Britain, where Air Power is concerned, is not the strongest. In point of fact, we are by this time reduced to a third-rate, if not indeed a fourth-rate, Air Power, and to think that our "gesture" will be appreciated as a sign of goodwill abroad is to fail lamentably to understand human nature. Rather will such a move be regarded as a sign of weakness, and we may be sure there will be those who will not be slow to profit by such assumed weakness. If we are really sincere in our desire for disarmament, there is one way, and one way only, in which that desirable state can be brought about. That is by first attaining such strength in the air that we can *demand* instead of *plead for* such disarmament. And most assuredly Great Britain is not to-day in a position to take a leading place in matters relating to a discussion of aerial disarmament.

In itself a sum of £200,000 may not be a large item, as public expenditure has come to be viewed in modern times, and it is the principle rather than the amount with which we disagree. Yet it must not be overlooked that this sum would purchase something like 24 aeroplanes, or sufficient to equip two squadrons. It is, therefore, seen that, relatively small as is the amount of money under discussion, it is by no means insignificant when it is remembered that many of our existing Air Force squadrons are still using machines designed in 1917 or thereabouts, when they should have been completely re-equipped two or three years ago. Incidentally, the fact that the "sports money" would almost equip two squadrons with new machines, or one squadron and its reserves, may serve as an eye-opener to those who have not yet realised how relatively cheap Air Power is, as compared with other forms of armament.

Turning to the second reason given for the proposed reductions, the urgent need for economy, there is such a thing as false economy. The man who insures a house worth £5,000 for £1,000 is paying a smaller premium, certainly, and may think he is economising. But if his house is burned down he is likely to realise rather vividly that what he had been practising was very much in the nature of false economy. Now the amounts spent upon air defence can justly be regarded as an insurance premium, and in this form of insurance, as in all others, we shall get what we pay for. If the rumoured reductions are to be made we venture to say that Great Britain will be very much in the position of the man who insured his house for far less than it was worth. Apparently, we are acting on the assumption that there will be no "fire" for some years to come. While that may be so, and it is sincerely to be hoped that it will be so, there is absolutely no guarantee that some incendiary will not run amok one of these days, and in that case we may find that far from having saved money we have been wasting money, by paying for an air force which is inadequate.

Real economy consists in getting value for money, and if we spend as little on the air as apparently it is proposed to spend during the coming financial year we shall most decidedly not be getting value for our money. It will be small consolation, should anything go amiss, for the taxpayer to be told that he got what he paid for, and the security which our air forces, and our aircraft industry, will secure under the proposed cuts, will certainly be to a very large extent illusory.

There is a tendency, where air defence is concerned, to look upon the "first-line" equipment as all that matters, and to assume that if we have plenty of first-line machines all is well. Nothing could be farther from the truth. The wastage of aircraft in war is very large indeed, and unless, therefore, we possess ample reserves a very short period of war would see us without aircraft. The first line must be strong because if an attack were to come it would come with dramatic suddenness and give no respite for preparations. The first line is useless, after the first onrush, unless backed up by ample reserves. And a strong first line with adequate reserves cannot be provided by cutting down orders for aircraft. Even if it could, there is still another reason why orders for aircraft, not enormous orders but orders issued at fairly regular intervals so as to maintain continuity, must be forthcoming. The British aircraft industry had been given to understand that such continuity of orders might be expected for some years to come, and on that assumption many firms spent a great deal of money on research and experiment. Some spent a good deal more in this manner than they could really afford, in the belief that the Government would adhere to a policy which a Conservative Government had formulated and a Labour Government sanctioned and pursued. Yet we now find a Conservative Government prepared to deviate from that policy to an extent which may have the most serious consequences. If the proposed reductions come about more than one aircraft firm will have to go out of business. The present 20 firms or so are just considered, by qualified and impartial judges, a bare and very meagre sufficiency for the expansion which an emergency would necessitate. *A depleted industry would be far from sufficient.*

These are the main points of the argument which we would like to see impressed upon the man in the street, upon the British taxpayer. If the Government insists upon its air reductions, then the British public is entitled to be told definitely that the security which our present air defences can provide is largely illusory.

It should be pointed out that the foregoing remarks apply not only to aircraft construction firms, but also, and probably to an even greater extent, to aero engine firms. To develop and perfect a new type of aero engine requires very much longer time, and costs infinitely more money, than does the production of a new type of aircraft. And if the proposed reductions in orders for aircraft take effect, the aero engine firms are likely to be faced with very serious difficulty in carrying on. Thus not only valuable and irreplaceable designing staffs would be lost, but hundreds of skilled workmen would be dispersed and it would be almost impossible to get them together again in time of national emergency.

Let the Government make no mistake on this vital question. Britons must make up their minds one way or the other. Either they must be prepared to support an air defence force adequate to the Empire's needs, or the Air Force might as well be scrapped altogether. To pay for an inadequate air force is not economy; it is reckless waste.

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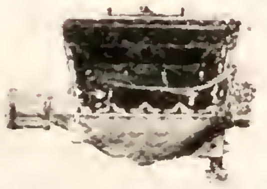

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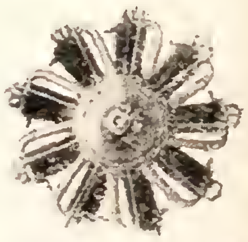
27/60 h.p. "Cirrus"

Avro type 504K

Bristol Fighter

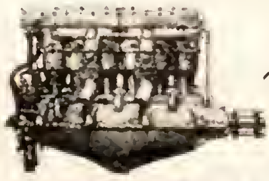
200 h.p. B.R.2.



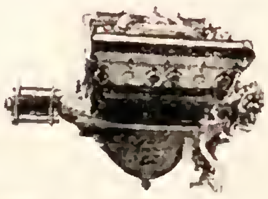
110 h.p. Le Rhone

D.H.9

Sopwith Snipe



240 h.p. Siddeley "Puma"



210 h.p. Viper

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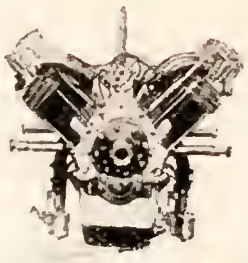

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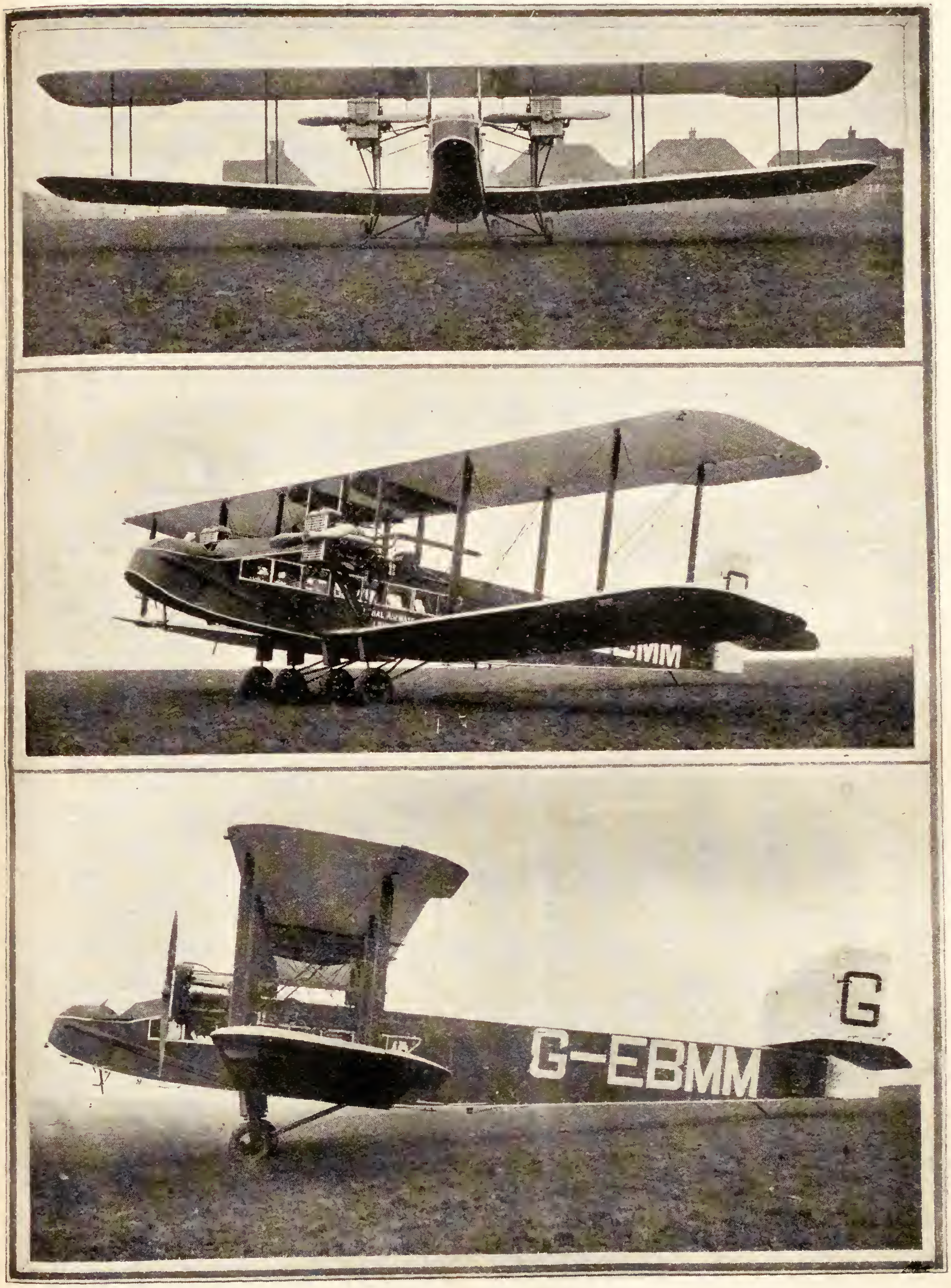
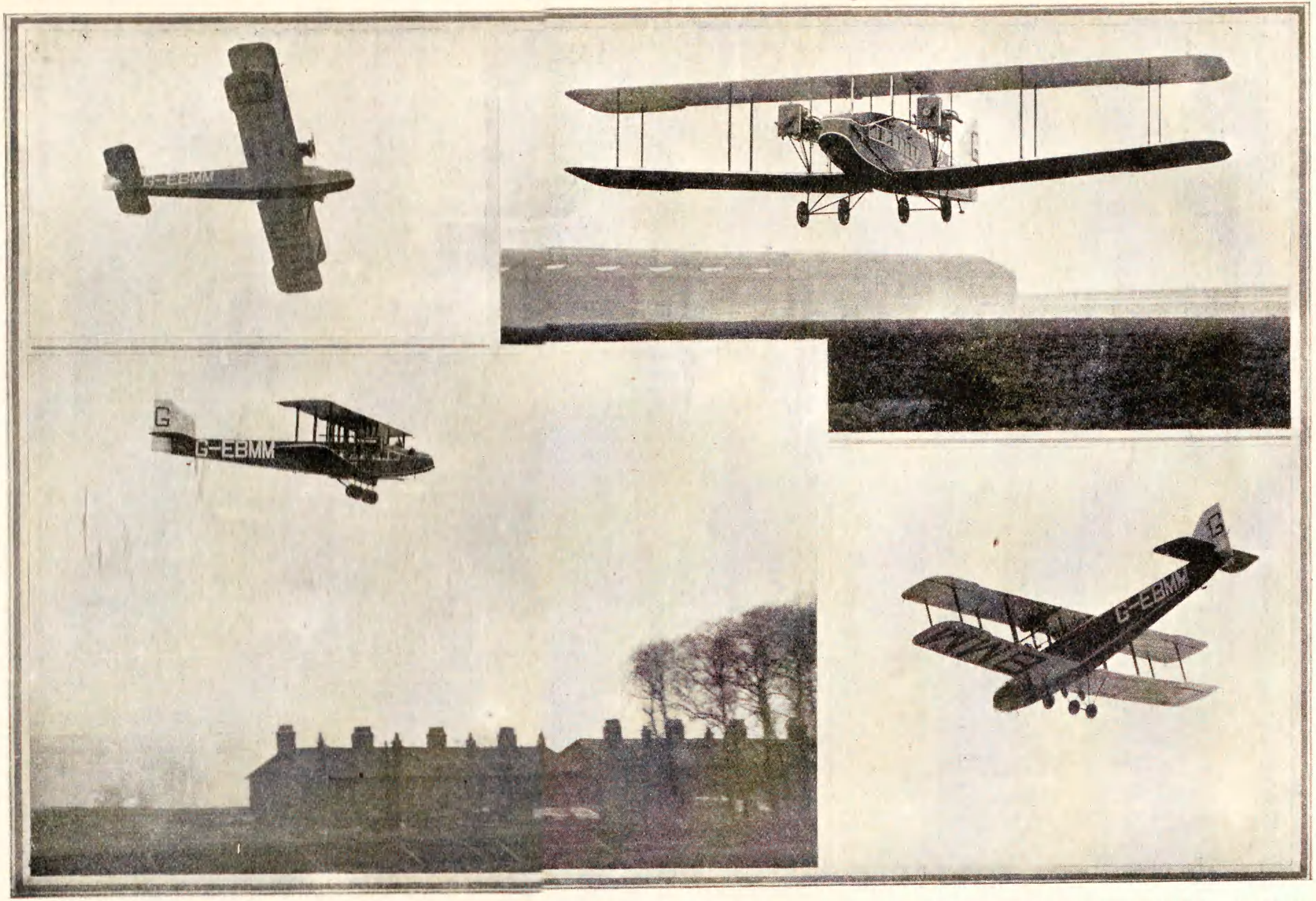


A PASSENGER MACHINE FOR IMPERIAL AIRWAYS : These views show the first of a batch of Handley Page W.10 14-seaters with two Napier "Lion" engines. The new machine is generally similar to the W.8, from which it has been developed. Note the new fin and rudder in the side view.



THE HANDLEY PAGE W.10 IN FLIGHT: These four views, taken at Cricklewood recently, show the new H.P. machine in various attitudes during a test flight. The pilot on this occasion was Capt. Hubert Broad.

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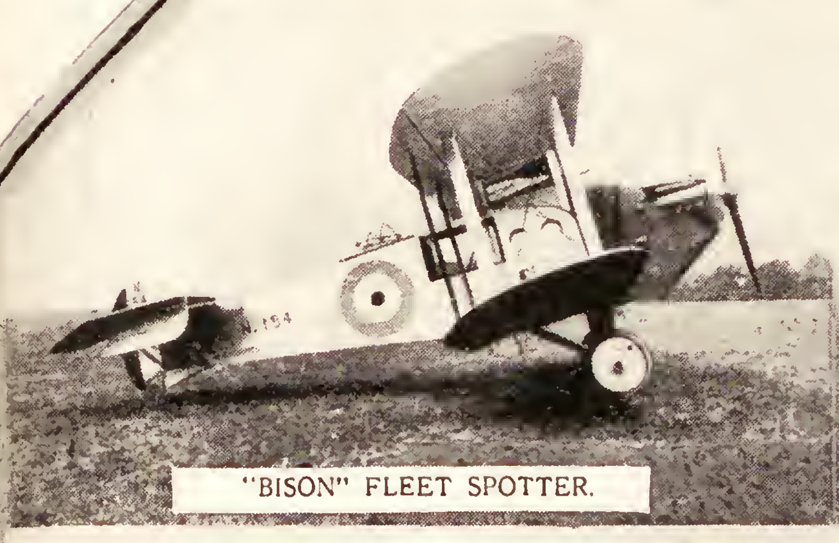

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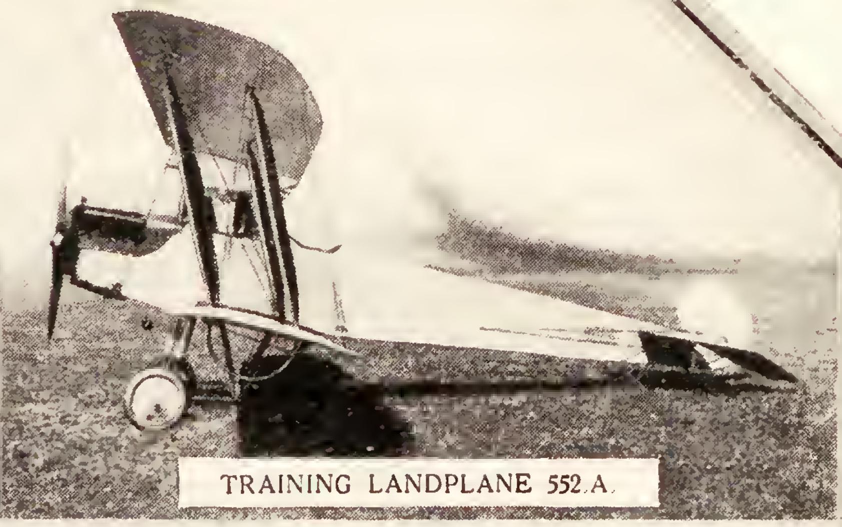
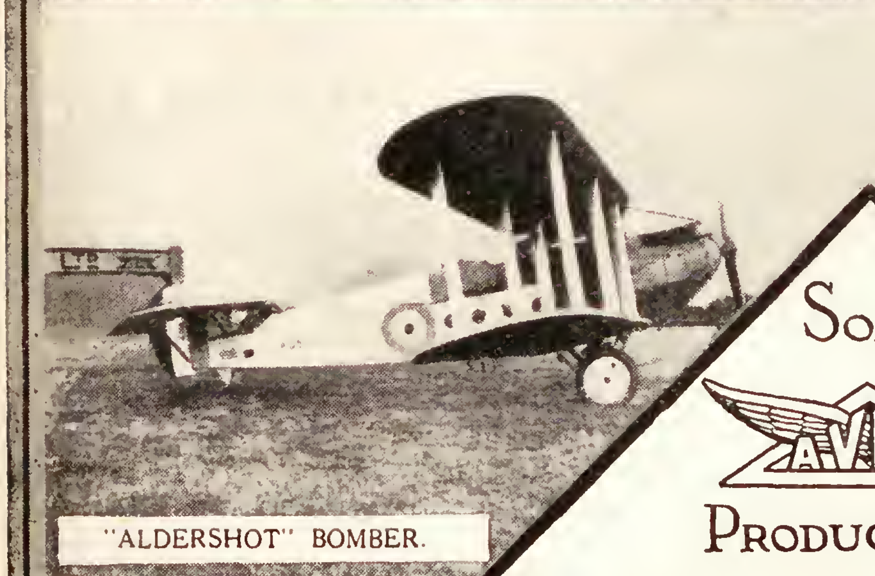


TRAINING LANDPLANE 552.A.



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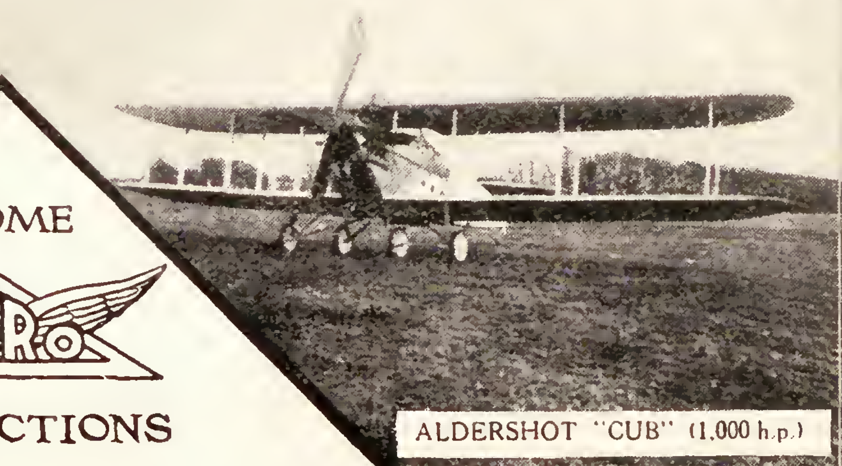

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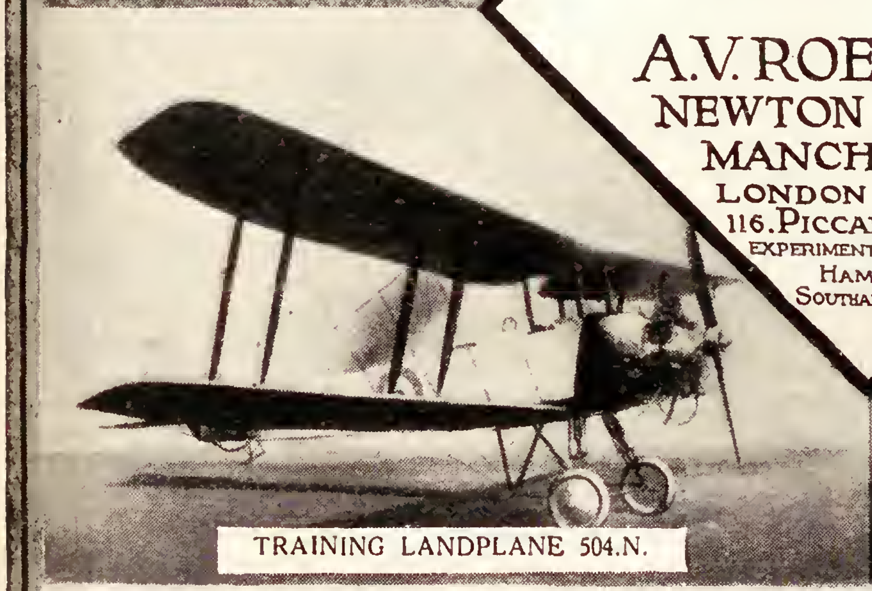

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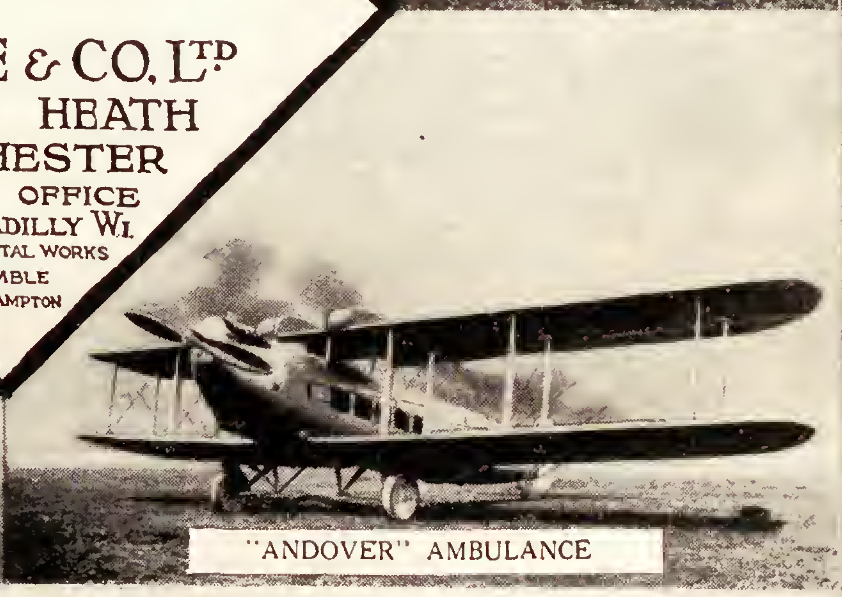

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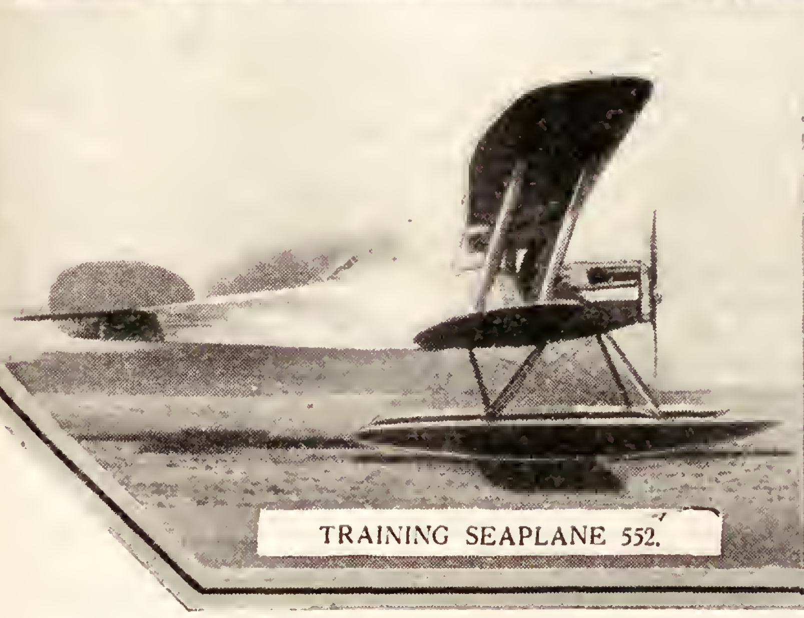

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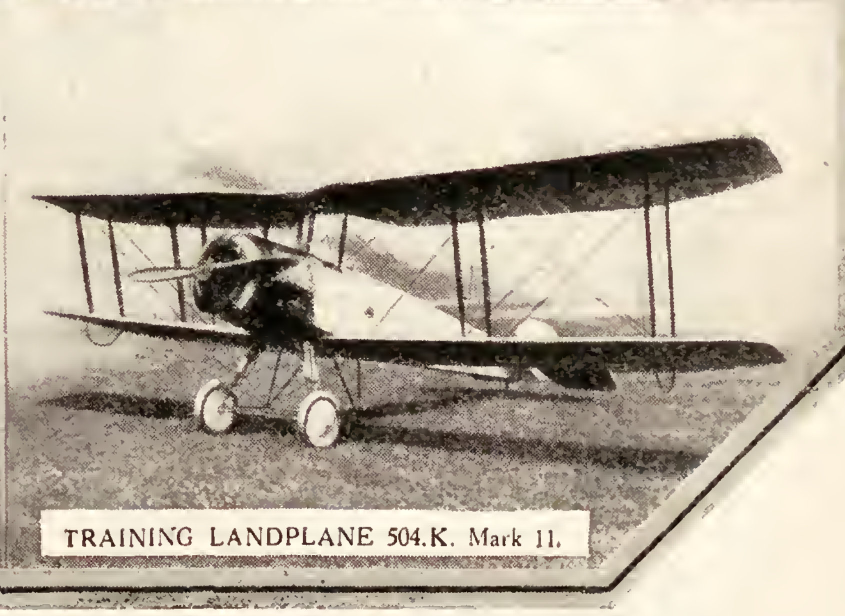

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A NEW PASSENGER MACHINE FOR IMPERIAL AIRWAYS

The Handley Page W.10 With Two Napier "Lions"

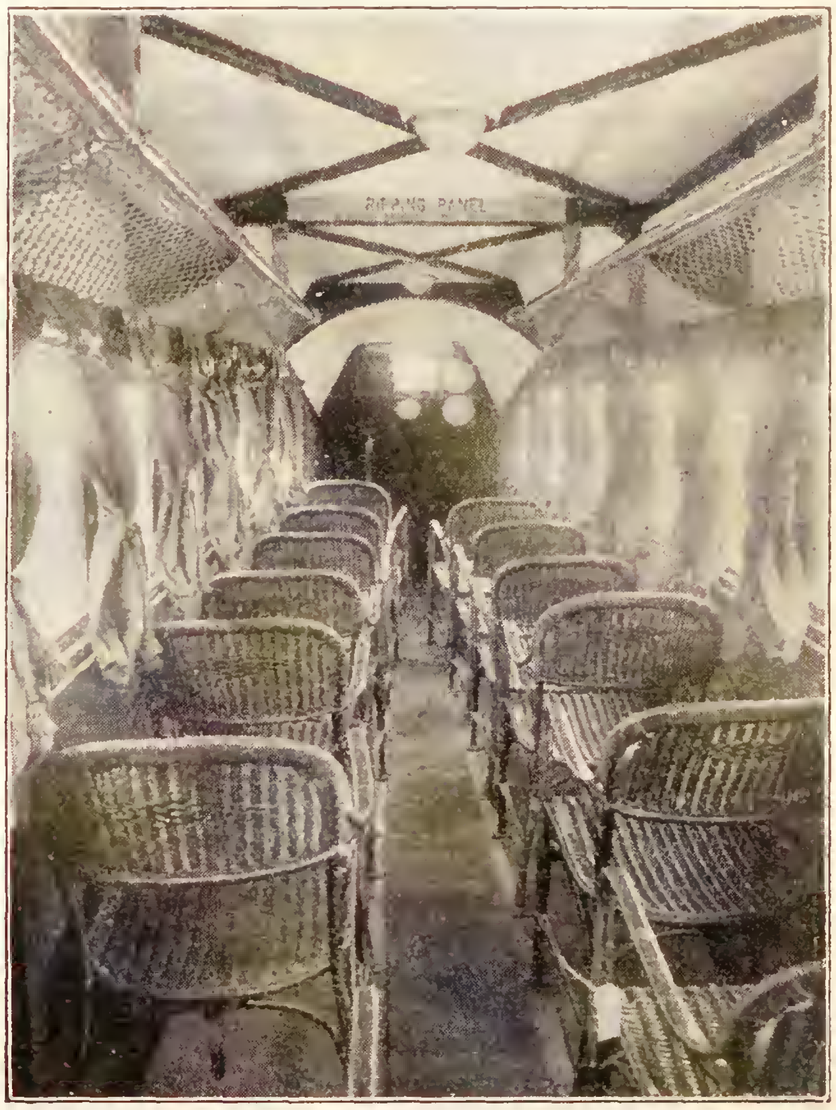
LAST week the first of a batch of new passenger-carrying aeroplanes for Imperial Airways, Ltd., was demonstrated at the Handley Page aerodrome at Cricklewood, the pilot being Capt. Broad, the well known de Havilland test pilot, who had been "lent" for the purpose. The new machine is known as the type W.10, and as our photographs on pages 87 and 88 will show, it is generally similar to the original Handley Page W.8 which won first prize at the Government competition at Martlesham some years ago. That is not to say that no improvements have been made. The W.8 has passed through a series of minor modifications since that time, and has appeared in various guises and with various engines. The W.10 is fitted with two Napier "Lions," as was the original Martlesham machine, but changes have been made in the engine mounting on the wings, in the cabin accommodation, and in the rudder and fin.

As regards the cabin or saloon, this has been somewhat changed in the W.10, so that now the luggage compartment is aft of the cabin, with a separate door enabling goods or luggage to be loaded without interfering with the door leading to the cabin, in exactly the same way as in the new three-engined Handley Page machine described and illustrated in FLIGHT recently. There is seating accommodation in the cabin for 14 passengers, the seats being of the wicker work variety, arranged along the sides and leaving a gangway clear down the centre, as shown in the accompanying photograph.

Provision is made for heating the cabin, the warm air entering at floor level and the cold air through the tubes supporting the net racks above the windows.

The Napier "Lion" engines are mounted in the gap between the wings, but slightly farther forward than in the earlier machines so as to trim the machine, and the petrol tanks are supported underneath the top plane, giving direct gravity feed to the engines, without the use of petrol pumps.

Those familiar with Handley Page machines will note that the fin and rudder have been somewhat re-designed. We gather that the directional control of some of the older types left something to be desired, and the new type of tail has been designed to effect an improvement, which it is stated definitely to do. The fin is taller and narrower than the old type, while the rudder is now a plain rectangle of fairly high aspect ratio. In place of a horn balance at the top, projecting over the top of the fin, the new rudder is mounted and balanced in the manner often employed to balance ailerons, *i.e.*, it is mounted on brackets extending aft ftom the fin post, the hinge line being roughly one-third the chord of the rudder from the leading edge, so that the front third of the area forms the balance. The new type of rudder is said to be very effective, and as will be readily realised, a powerful rudder control, important in all types of machine, is essential in a twin-engined type, owing to the turning moment which may arise through the stoppage or falling off in power of one engine.



THE HANDLEY PAGE W.10: View inside the saloon, looking forward. There is seating accommodation for 14 passengers.

Exact performance figures are not available, but it is believed that the cruising speed of the Handley Page W.10 will be in the neighbourhood of 100 m.p.h.

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London–Cape Town Survey Flight

BY the time this week's issue of FLIGHT is in the hands of our readers it is almost certain that Mr. Alan Cobham will have brought his flight from London to Cape Town to a successful conclusion. Mr. Elliott, the man who tended the Siddeley "Jaguar" of the D.H. 50, having recovered from his illness, Cobham left Johannesburg on February 15, arriving early that afternoon at Kimberley. Proceeding next day they reached Bloemfontein, where they were entertained at luncheon by the Mayor. At the time of writing we understand that he hoped to complete the last 620 miles to Cape Town on Wednesday. However, we are afraid that it is a question of "to be continued in our next".

German Air Transport

ACCORDING to *The Times* correspondent, Herr Schreiber (German Minister of Trade) stated in the Prussian Diet on February 15 that of the increase of 2,500,000 marks (£125,000) in the estimates for civil aviation as compared with last year's appropriation, 1,500,000 marks (75,000) was destined for the participation of Prussia in the new single air transport company known as Lufthansa Gesellschaft. The rest was to be devoted to the subsidising of air ports and aeronautical research. He said that during the six most important months of last year from the point of view of aviation, more than 2,500,000 miles had been flown and 48,000 passengers had been carried. In 1924 the number of aircraft which left the Tempelhofer aerodrome was 476; in 1925 it was 4,725. The same number, 476, landed in the aerodrome in 1924; last year 4,729 machines landed there. The number of passengers carried by aircraft using the aerodrome in 1924 was 1,700; in 1925 it was 20,400. Thirty times as much mail as in 1924; 40 times as much baggage, 14 times as much newspaper freight, and 100 times as much general freight was dealt with in 1925.

An Aeroplane Club for Essex

A NEW aeroplane club, known as the Essex Aeroplane Club, is now in course of formation. Tuition and flying practice will be given on Avro 504K machines in addition to De Havilland "Moths," and it is hoped to make a start in the course of a few weeks at an aerodrome close to London. Membership of the Club is open to both sexes, and those interested should send a stamped envelope for particulars to the Secretary, Flying Officer W. Knox, 21, Airlie Gardens, Ilford.

Well Done, Bermondsey!

FOR the first time, as far as we are aware, a London Borough has realised the possibilities of aircraft and has made use of the advantages so offered. The Bermondsey Borough Council has voted a sum of 20 guineas to its Libraries Committee for the purpose of obtaining an aerial survey of the whole of the borough. It was pointed out that such a survey, particularly if repeated at regular intervals, would be of extreme interest and value as a record of the changes and developments taking place in the Borough. The work is to be carried out at the first suitable opportunity by the Surrey Flying Services of Croydon.

INTER-SERVICES RUGBY FOOTBALL

Royal Air Force *v.* Royal Navy

Royal Navy, 1 goal and 1 try (8 points); Royal Air Force, 1 try (3 points)

This, the first of the Inter-Service Rugger matches, was played on Saturday, February 13, and, thanks to a perfect spring-like day succeeding the heavy rain of the day before, took place under ideal Rugger conditions and drew a crowd of about 8,000 to Twickenham. The R.F.U. ground makes a wonderfully quick recovery from rain, given a few hours' sunshine, and was at its best. The evening before the match I had had visions of a repetition of last year's quagmire game when these teams met, and almost pictured the handy men of the Navy improvising a few lines of duckboards for the use of their three-quarters, but as things turned out the ball was never anything but dry—hence there was little excuse for numerous passes on both sides which were not well and truly taken—nor was there a single player at the end of the game whose identity, as regards either colours or number, was hidden beneath an over-layer of mud, as was the case a year ago, when it was almost an impossibility to sort out the sky blue of the R.A.F. from the Navy's dark blue.

The Navy lost no time in making it clear that they intended to wipe out the somewhat fortunate victory of the Air Force by a penalty goal to nil at their last meeting, and by doing so secured their fifth win out of their seven encounters with the R.A.F., with a total of 78 points to 30, so that the balance is heavily against the Air Force. The result was in accordance with expectations, though at times the airmen not only threw off the more or less constant pressure of the Navy XV, but even gave ground for hopes—until Sub-Lieut. Lee scored his try under the posts near the end of the match—that in one of their onslaughts they would pull the game out of the fire and snatch another victory against the run of the play.

Only three Internationals were playing—W. G. E. Luddington and William-Powlett for the Navy, and C. N. Lowe for the R.A.F. Luddington (who, as events turned out, might with advantage have been included at his customary place in the English pack to stem the Irishmen at Dublin) skippered the Navy, and as usual put in a great amount of hard work without making himself specially prominent. The airmen were again captained by Sqdn.-Leader J. C. Russell, who emerged with honours from a very busy afternoon's work on the defence. With the exception that S. H. G. Trower took the place of P. S. Scott as the R.A.F. left wing three-quarter, the teams turned out as announced.

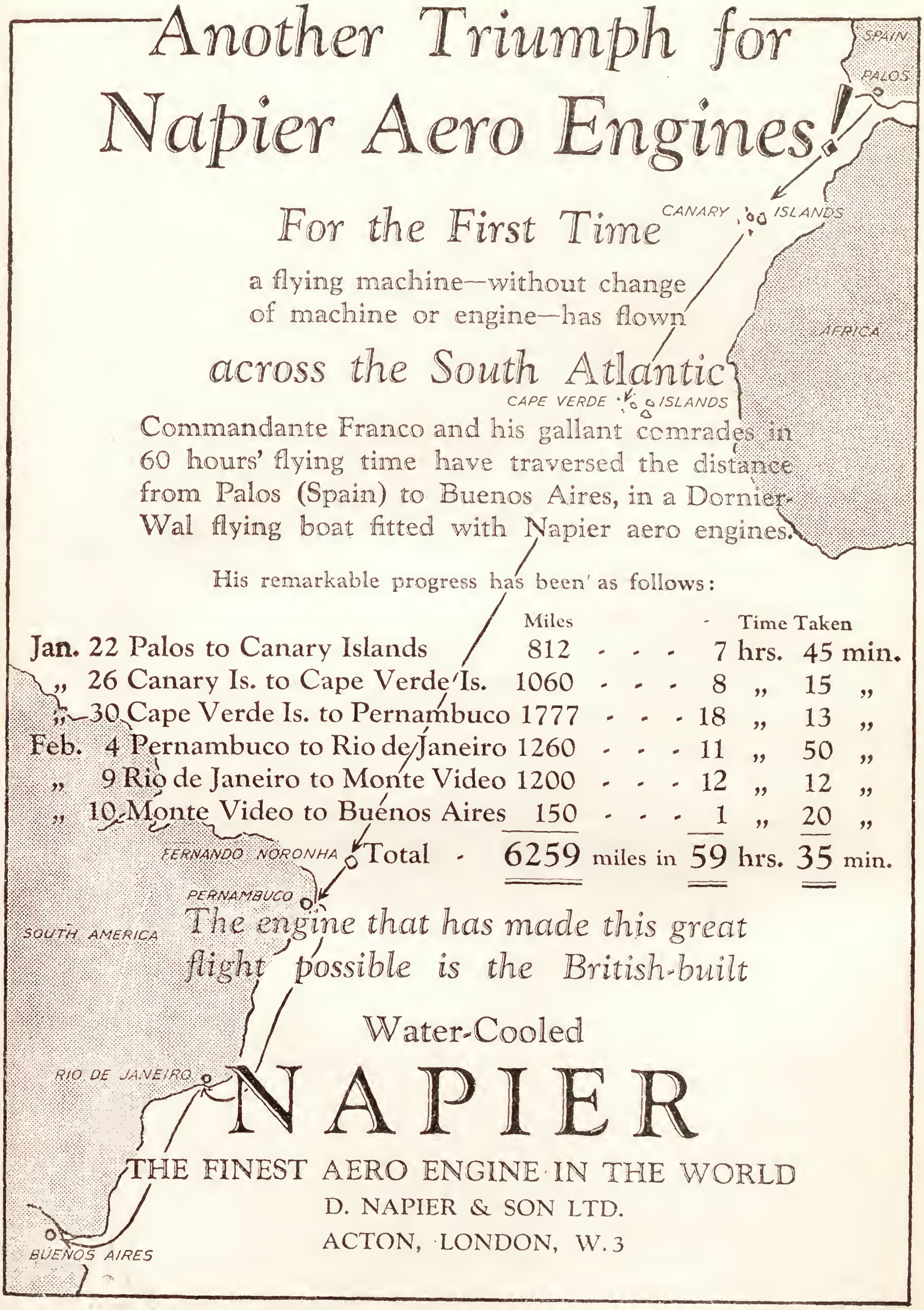
Looking back on the play, I think it must be conceded that the Air Force XV was not up to the level of last season. In the vital work behind the scrum the Navy had the pull for the best part of the game. The machinery linking the Air Force halves to the three-quarters did not functon as it should have done, and when that is the case no amount of effort by the pack or by individual players can re-adjust the balance. From the scrum—though the Air Force held their ground—the ball went out to the Navy three-quarters with almost monotonous regularity, thanks largely to superior heeling. Passing movements were set going to carry the ball down the Navy line with regulation precision, and but for the deadly tackling, which was the outstanding virtue of both teams, there would have been a heavier score on the board. In fact, there was a little too much precision, and too little guile, in the Navy's passing, for its execution "according to plan" enabled the airmen to get there in time to be in at the death, and to put on the extinguishing touch. Now and then the Air Force indulged in good passing, but inaccuracy usually crept in somewhere to mar the effort, and it was very rarely that their three-quarters got really going as a line. Nor have the Air Force yet learned that it is dangerous to give away the number of free kicks which again on Saturday were awarded to their opponents.

To go into details, the Air Force kicked off, and from the first scrum the Navy showed their superiority in getting the ball, but a breakdown in their passing gave the Air Force an opportunity, which came to nothing for the same reason. Within a few minutes the Air Force were on the defensive in their own 25, and things looked none too bright for them until a free kick for an off-side tackle on Lowe relieved the pressure, which, however, was almost immediately resumed. Lee, who was the best three-quarter on the field, broke away and got within a few yards of the line before he was brought down. The Navy made a great effort to push home their advantage, but stubborn tackling prevented a score. They were having nearly all the game, and a penalty for off-side against the airmen gave Richmond an opportunity, which he nearly brought off, to land a goal from far out. A series of dangerous scrums close to the Air Force line met with no success, but Lee again came within an ace of getting over. Garrett had a try at dropping a goal from close in, but just missed. In this defensive play all the Air Force backs were good, with Russell, Chambers and Bryson perhaps the most prominent. With a little luck the Navy might well have reached double figures in the first 20 minutes. The game had been in progress nearly half an hour when the airmen roused themselves and took a brief tenancy of the Navy's 25. A penalty kick by Lowe from midfield came close to success, and following up with some strong rushes, in one of which Hoskin, the Navy full-back, failed for once to gather the ball, the Air Force broke through. Rose, with a naval escort on top of him, bringing off a fine try close to the corner flag, which was not converted.

A lead of three points after having had so rough a journey seemed to give the airmen a new interest in life, and for a while they maintained pressure. The Navy, however, again took up the running, and Cumberbatch gained a lot of ground with a long kick which was missed by Wilson, and it was only the timely arrival of Chick which averted trouble. Play remained in Air Force territory from this until the interval, and after Garrett had missed from a mark, Knapman, who was in great form, made a determined attempt to go in on his own account, and failing to find a way through passed to Lee, who slipped in like a flash for an equalising try, again at the corner. Luddington took a difficult kick without success, immediately after which the whistle went for half-time, with the score 3 points all.

The second half was more even, though the Navy continued to have the upper hand most of the way. On several occasions they got close to taking the lead, and scrum followed scrum in the Airmen's half. Cumberbatch looked like scoring but was flung into touch when nearing the line. Lowe intercepted a pass which might otherwise have let the Navy through, but a moment later they were again well in the Air Force 25, with Lee and Cumberbatch always dangerous on the right wing. A spell of midfield play followed, without any particular incident excepting two or three incursions by the Air Force which were safely dealt with by the Navy backs, though there was always enough thrust about the Air Force attack to warrant hopes of another score. Hoskin, who throughout played a fine game at full back, was limping badly, but carried on with his job; and Orr-Ewing, one of the outstanding men in the Navy's forward line, and Knapman, also met with minor injuries necessitating short stoppages of the game. Trower was instrumental in stopping another Naval raid, but matters were not going at all well for the airmen. Knapman was well brought down by Hampton when going in for a try under the posts; Lee, always an opportunist, gathered the ball and carried on over the line to score a try which Luddington had no difficulty in converting. In the remaining ten minutes the Air Force made desperate efforts to wipe off the arrears, and several times play was carried within a few yards of the Navy line, but there was no weak spot in the defence, and the game returned to the Air Force 25, where Lee once again would have got over but for a last moment tackle. To the finish the Navy continued to have the best of the play, and had the margin of points been wider than it was it would have more accurately reflected the trend of the game as a whole.

The honours for the R.A.F. defence were shared chiefly by Russell, Bryson and Lowe, their full back, Wilson, though effecting many good clearances, not being anything like as reliable as his *vis-a-vis*, nor was he as quick as a back ought to be in getting rid of the ball, or as safe in finding touch. Lowe had few chances to distinguish himself in attack; he was none too well served with the material therefor, and on those occasions when he did show signs of breaking away he was too well marked by his opposite numbers to do much damage, such being the penalty of fame. Chambers and Russell, as halves, showed up better in defence than in feeding their three-quarters. There was not a great deal to choose between the two sets of forwards except in the important matter of heeling out already mentioned. Chick, who lived well up to his reputation as a hard worker, Christie and



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His remarkable progress has been as follows:

		Miles	Time Taken	
Jan. 22	Palos to Canary Islands	812	7 hrs.	45 min.
„ 26	Canary Is. to Cape Verde Is.	1060	8 „	15 „
„ 30	Cape Verde Is. to Pernambuco	1777	18 „	13 „
Feb. 4	Pernambuco to Rio de Janeiro	1260	11 „	50 „
„ 9	Rio de Janeiro to Monte Video	1200	12 „	12 „
„ 10	Monte Video to Buenos Aires	150	1 „	20 „
Total		6259 miles in	59 hrs.	35 min.

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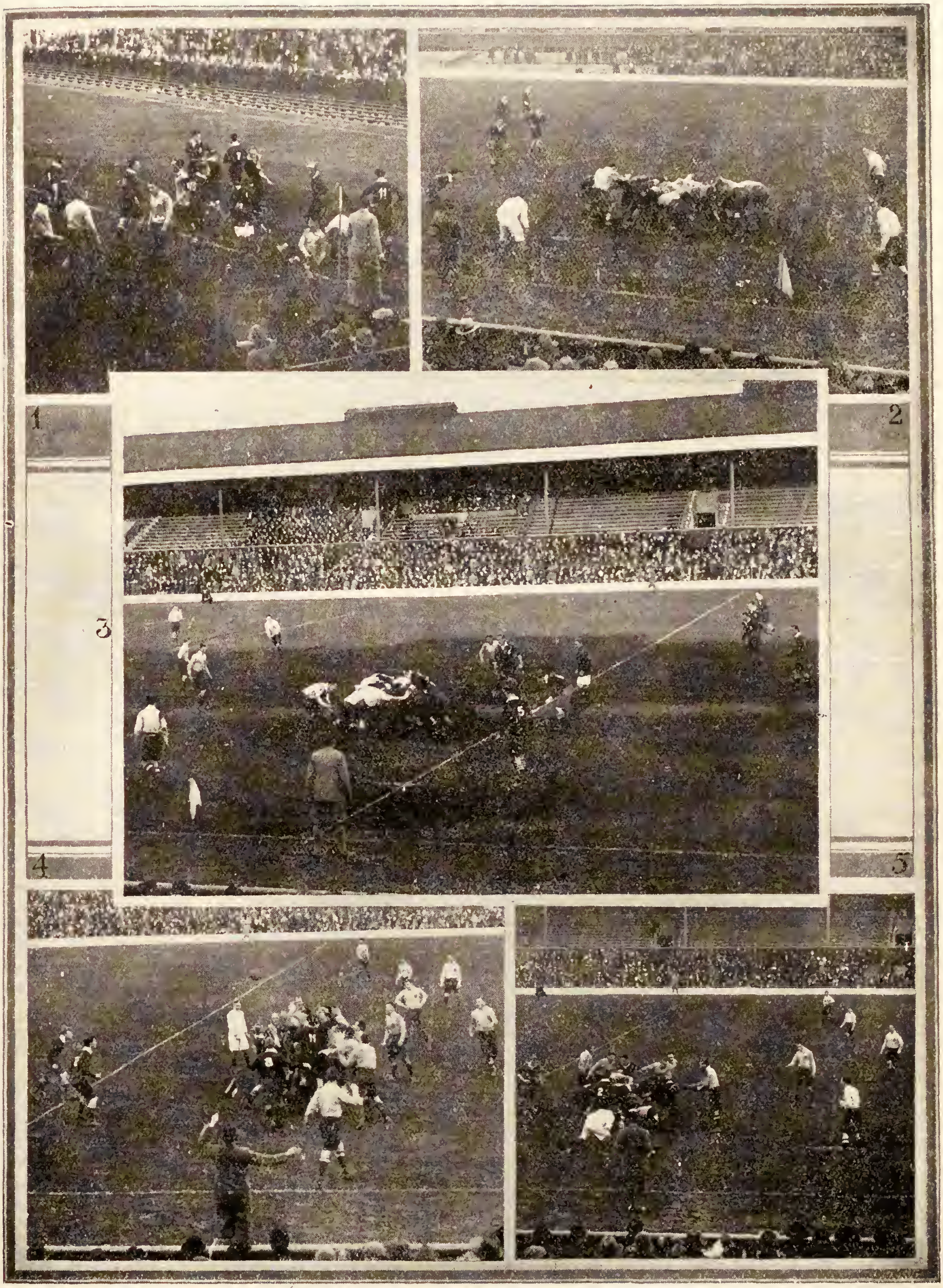

SERVICE RUGGER: The R.A.F. *v.* Navy Match at Twickenham resulted in a win for the Navy. Above photographs illustrate various phases of the match: 1, The R.A.F. open the scoring. 2, a scrum in R.A.F. territory during the second half of the game. 3, a fight for the ball near the Navy's 25 line. 4, "all hands to the ball." A line-out during the second half. 5, a spirited defence by the R.A.F. A melee inside the R.A.F. 25 yards line.

O'Malley were perhaps the most conspicuous of the R.A.F. pack.

From the standpoint of Rugger as it should be played it could not be called great football, though at any rate it was a hard tussle fought to the finish in the best spirit: vigorous thrusting and hefty tackling in plenty, but clean play throughout. One came away from Twickenham, however, with a feeling that the Army XV will come out on top when they meet the Navy and the R.A.F. respectively on March 6th and 27th, unless a vast improvement in team-work takes place meanwhile in both the sides playing last Saturday.

The teams were :—

The Royal Navy.—Shipwright S. Hoskin (H.M.S. *Vivid*), back; Lieutenant H. C. Cumberbatch (H.M.S./M.H.23), Sub-Lieutenant T. S. Lee (H.M.S. *Tiger*), Sub-Lieutenant R. W. Armytage (H.M.S. *Pembroke*), and Lieutenant M. Richmond (H.M.S. *Victory*), three-quarter backs; Lieutenant C. R. Garrett (H.M.S. *Victory*) and Able-Seaman C. R. Knapman (H.M.S. *Vivid*), half-backs; Master-at-Arms W. G. E. Luddington (H.M.S. *Thunderer*), Able-Seaman W. Paddon (H.M.S. *Vivid*), Lieutenant R. D. Fricker (H.M.S. *Thunderer*), Lieutenant G. C. F. Branson (H.M.S. *Excellent*), Lieutenant P. B. R. W. William-Powlett (H.M.S. *Savage*), Lieutenant D. Orr-Ewing (H.M.S. *Vivid*) Lieutenant A. A. Havers (H.M.S. *Pembroke*), and Sub-Lieutenant H. T. Armstrong (H.M.S. *Excellent*), forwards.

The Royal Air Force.—Flying-Officer C. B. Wilson (No. 22 Squadron, Martlesham Heath), back; Pilot-Officer the Earl of Bandon (No. 4 Squadron, Farnborough), Squadron-Leader C. N. Lowe (No. 602 Squadron, Renfrew), Flight-Lieutenant O. C. Bryson (Cadet College, Cranwell), and Flying-Officer S. H. G. Trower (Northolt), three-quarter backs; Flying-Officer P. J. Chambers (Cadet College, Cranwell) and Squadron-Leader J. C. Russell (No. 3 Squadron, Upavon), half-backs; Flight-Lieutenant J. S. Chick (Experimental Section, R.A.F. Farnborough), Flight-Lieutenant E. F. Turner (No. 502 Squadron, Belfast), Flight-Lieutenant T. Rose (No. 13 Squadron, Henlow), Corporal N. W. Johnson (Record Office, Ruislip), Corporal M. G. Christie (R.A.F. Depot, Shrewsbury), Pilot-Officer J. G. Franks (No. 56 Squadron, Biggin Hill), Leading-Aircraftsman J. F. Hampton (Record Office, Ruislip), and Flying-Officer C. J. S. O'Malley (Technical Training School, Halton), Forwards.

Referee.—Mr. T. H. Vile.

G. L.

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CORRESPONDENCE

The Editor does not hold himself responsible for opinions expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters intended for insertion in these columns.

METAL v. WOOD.

[2121] The articles in The Aircraft Engineer by Messrs. Green and Short on metal construction are valuable summaries of first-hand experience, and are particularly interesting because they bear on a subject which is treated sometimes in a more or less controversial way which generally has the effect of obscuring real issues.

If it were not for the difficulty of obtaining good spruce, the enormous rejections, and the obvious drawbacks of having to import it from a great distance, a closer comparison of wood and metal as structural materials would be very interesting. The situation, however, is dominated by the necessity of not being dependent on the supply of long lengths of good spruce. In other words, metal spars and struts are becoming necessary, and it seems that this is the point upon which to concentrate. When satisfactory spars are obtainable in metal—and by "satisfactory" is meant many things, such as ease of production and moderate cost for small numbers, etc.—the spruce difficulty will be over as far as wings are concerned, and for ribs, leading and trailing edges, etc., wood is entirely suitable and obtainable in any national emergency in the necessary quantities. It may be said, therefore, that apart from the main members, the use of metal can be determined by ordinary considerations, such as cost, maintenance, etc. In the case of fuselages, it is not easy to see what advantages can be claimed for metal construction, if an adequate supply of 3-ply wood is obtainable. It is certainly very doubtful if the combined lightness and stiffness of the 3-ply and wood fuselage can be obtained in metal. The question of length of life in hot climates remains to be answered, for the present position is that there is practically no experience of metal under these conditions, whereas the wood and 3-ply fuselage, suitably protected, has already proved itself to be thoroughly satisfactory in hot climates. It may, in future, be necessary to depart from this form of construction for supply reasons, but apart from this necessity it seems a highly desirable type to retain.

Major Green makes an interesting comparison of wood, Duralumin and steel as materials. This comparison is a difficult one to make owing to the uncertainty of the ultimate strength of the steel. If a rectangular beam of spruce with a compressive strength of 5,000 lb. per sq. in., is tested it will develop a fibre stress of about 8,000 lb. per sq. in. before failure. An ordinary spar section may not quite attain this figure, but will in general exceed 7,000 lb. per sq. in. Similarly the figure given for Duralumin is the approximate yield stress of this material, the ultimate being largely in excess of this. Thus wood and Duralumin have a large reserve of strength against actual failure of the structure, since their load factors are calculated on the low figure. If an aircraft were seriously overstressed, compression "shakes" would appear in wood, and in both wood and Duralumin deformation would occur without failure of the structure. It would be interesting to know to what extent this reserve against failure exists in the steel-strip spar, when its factors are calculated on the "Proof Stress." Presumably it would be considerably smaller.

Our firm has recently been testing metal spars, for a certain machine, and in making check tests on the actual spruce spars used in the same type, it is certainly striking to notice in every case the great margin of strength against actual failure over that calculated.

Metal spars, however, have got to come, and it will be interesting to watch their evolution. Steel has the advantage of being a more home-produced material, while Duralumin, as pointed out by Mr. Short, has certain structural and manufacturing advantages—is well adapted to float construction, and is likely to be improved in its physical characteristics.

While weight of structure is naturally of great importance, it can be exaggerated. An easily produced and cheap metal spar woud be worth adopting, even if it were 10 per cent. heavier than wood. It would in fact be more valuable in most cases than a difficult and costly spar weighing 10 per cent. less than wood. The effect on the total weight of the aircraft would be small in either case.

Stag Lane Aerodrome,
Edgware.
February 11, 1926.

C. C. Walker.

METAL CONSTRUCTION.

[2122] I have read with interest Mr. Oswald Short's notes on my article in The Aircraft Engineer on steel construction for aeroplanes. There is little doubt that in case of emergency it would be possible to obtain supplies of bauxite from Northern Ireland, and that in time we should be able to manufacture our own supplies of aluminium. Unfortunately, the time taken in getting going would be serious, and unless we had large supplies of aluminium there would probably be a serious shortage, for a time at least. There is scarcely the same chance of shortage of steel, and in any case we should be in such a hopeless position without steel that it would not much matter whether we could make aeroplanes or not.

With regard to Mr. Short's other point, the question is whether it is safe to work to a higher stress than the proof stress. In the British Standard Specification 2L3 the proof stress is given as 13·5 tons to the square inch. I am well aware that it is possible to obtain stresses that are higher than the minimum proof stress when testing spars, but I am not at all sure whether it is wise to work to a higher stress, particularly when reversal of stress will occur. There are many samples of aluminium alloys that are a good deal above the present specification, but this is equally true of steel. I have some recent tests of strip steel which gave a proof stress of over 80 tons to the square inch, as against 55 tons, which is the figure I used for comparison with Duralumin.

I have little doubt but that the strength of aluminium alloys will gradually be improved in the same way as the present-day high-tensile steels are being developed, but at the present time I do not think that we are justified in basing our designs of Duralumin spars on a higher figure than I gave in my article. It, therefore, seems to me that we can make lighter spars using steel, and we are also freed from the possibility of having to re-organise our source of supply in case of war.

Coventry.
February 15, 1926.

F. M. Green.

Leonard Bridgman 1926
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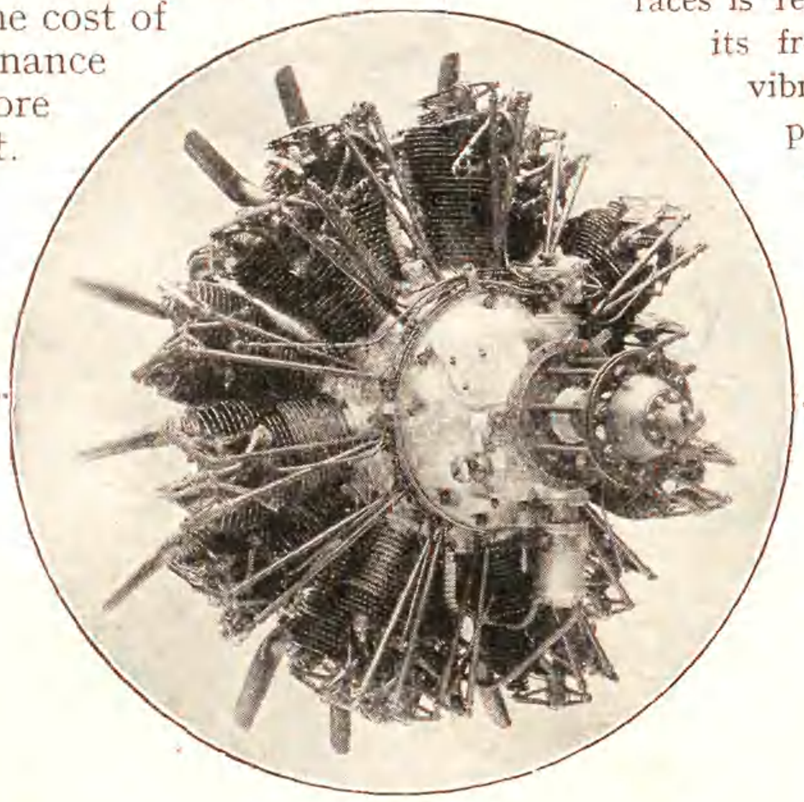

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ANGLOCO

The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

ANNUAL GENERAL MEETING

The Annual General Meeting of the Members of the Royal Aero Club of the United Kingdom will be held on Wednesday, March 31, 1926, at 6 p.m., at 3, Clifford Street, London, W.1.

Notices of motion for the Annual General Meeting must be received by the Secretary not less than 21 days before the meeting, and must be signed by at least five Members.

Committee.—In accordance with the Rules, the Committee shall consist of 18 Members. Members are elected to serve for two years, half the Committee retiring annually.

Retiring Members are eligible for re-election.

The retiring Members of the Committee are :—

Air Vice-Marshal Sir W. S. Brancker, K.C.B., A.F.C.
Ernest C. Bucknall.
Lord Edward A. Grosvenor.
Col. F. Lindsay Lloyd, C.M.G., C.B.E.
Lieut.-Col. J. T. C. Moore-Brabazon, M.C., M.P.
Lieut.-Col. M. O'Gorman, C.B.
Air Commodore C. R. Samson, C.M.G., D.S.O., R.A.F.
The Duke of Sutherland.

Owing to the death of Group-Capt. C. F. Kilner, there are only eight Members of the present Committee retiring this year.

Any two Members of the Club may nominate a Member to serve on the Committee provided the consent of the Member has been previously obtained. The name of the Member thus nominated with the name of his proposer and seconder, must be sent in writing to the Secretary, not less than 14 days before the Annual General Meeting.

TRANSATLANTIC FLIGHT

The Royal Aero Club has received the following telegram from the Royal Aero Club of Spain, in reply to its message of congratulation :—

> "We wish to express our profound appreciation of your kind message."

At the Banquet, held in Madrid, on Thursday, February 11, 1926, to celebrate the Spanish Transatlantic Flight, the Royal Aero Club was represented by Capt. H. H. Square.

Offices : THE ROYAL AERO CLUB,
3, CLIFFORD STREET, LONDON, W. 1.
H. E. PERRIN, Secretary

LIGHT 'PLANE CLUB DOINGS

London Aeroplane Club

The total flying during the week was 12 hours 25 minutes.

At present the Club has only one machine in service. A new D.H. "Moth" machine has been ordered to replace G-EBLU, but delivery is not expected until the end of March. Negotiations to acquire a machine to carry on in the interim, have not so far been successful.

During the week the following Members had flying instruction :—W. Hay, W. E. P. Johnson, F. P. Brough, G. Quirk, R. C. Brighten, H. O. Richardson, R. Thomas. H. P. Hunt, J. H. Saffrey, C. E. Murrell, R. C. Presland, J. S. M. Michie, R. Malcolm, S. O. Bradshaw, L. Anderson, N. Jones, G. N. Howe.

The following members flew solo :—Mrs. Eliott-Lynn, G. H. Craig, Squadron Leader M. E. A. Wright, G. N. Warwick, P. G. Lucas.

Capt. F. G. M. Sparks, on leave from his course at the Central Flying School, Upavon, assisted in the flying instruction during the week-end.

The Lancashire Aero Club

Flying took place on Wednesday and Saturday only. Mr. Scholes and Mr. Cantrill gave dual to the following :—H. Stern, 15 mins. ; M. Lacayo, 5 mins, R. Williams, 15 mins. ; D. Dyson, 20 mins. ; C. Parker, 45 mins. ; J. Leeming, 55 mins. ; C. Agar, 1 hr. 5 mins. ; H. Hardy, 40 mins. ; H. Smith, 1 hr. 35 mins. ; C. Colley, 35 mins. ; A. Macnair, 40 mins. ; J. Wilkinson, 35 mins. Solo flights by J. Wilkinson, 25 mins. ; M. Lacayo, 10 mins. Tests occupied 35 mins. Total dual, 7 hrs. 45 mins. Total solo, 35 mins. Joy Rides to three members, 45 mins. Total time flown, 9 hrs. 40 mins.

The above was all done on one machine, GEBMQ, presented to the Club by Sir Charles Wakefield.

Mr. N. T. Stack has been appointed the Club's Instructor. He will commence at Woodford on Wednesday, February 24. Appointments may be made by 'phone, letter, or in the book kept for this purpose in the Hangar, flying time may not be booked further than seven days ahead. Mr. Stack will arrange to give instruction and permit Solo whenever weather permits, and it is hoped that Members who can will put in as much time during the week as possible so as not to overcrowd the week-ends.

The Club's second Dinner Dance will be held at the Midland Hotel, Manchester, on March 12 (Friday). Tickets are 35*s*. each, as before there will be a Cabaret Show during the evening. Tickets are already well sold. At the last Dance the Committee were forced to return money to many people who applied late, after all the tickets had been disposed of. Early application in this case is advisable.

The Newcastle-upon-Tyne Aero Club

Flying report for week ending Sunday, February 14, 1926 :—

Very bad weather conditions were experienced during the week, but some flying was carried out each day.

The times were :—Dual, 13 hrs. 20 mins. Solo, 5 hrs. 22 mins. Tests, 25 mins. Passenger, 30 mins. Total, 19 hrs. 30 mins. All on "L.X.," which is on the way towards 300 hrs. now. The following Members flew under instruction with Major Packman :—

Miss C. R. Leathart, Mr. T. R. MacMillan, Mr. R. M. Stobie, Mr. G. H. Twine, Mrs. V. Marcks, Mr. L. Smith, Mr. C. Thompson, Mr. L. de Loriol, Mr. W. Todd, Mr. A. D. Bruce.

The following flew solo, or with passengers, all "A" pilots :—

Mr. W. Baxter Ellis, with Mr. P. F. Heppell as passenger, on one flight and Mr. H. Ellis on another.

Mr. R. M. Stobie, with Mrs. Kemp as passenger. Mr. R. N. Thompson, with Mr. Smith.

It is suggested that Mr. Heppell wondered what it felt like to fly as passenger ; hence the flight with Mr. Ellis. Mr. N. S. Todd was unable to attend the aerodrome during the week. It is believed that he is searching for a suitable "hangar."

It was whispered in the Clubhouse during the week-end that Major Packman was preparing to take the "Moth" to the Arctic when the exploration season begins again, though the only evidence put forward was that he was now wearing sheepskin (complete with wool) thigh boots. Some Members were of opinion, however, that these were quite necessary at Cramlington, while arctic weather is experienced there, so there may be no foundation for this rumour.

The Club was honoured with a visit by a R.A.F. Blackburn machine during the week.

The engine and gadgets for the "Gull" having arrived, further developments are expected at an early date.

Mr. R. N. Thompson has very kindly presented the Club with a complete Badminton set, marked the courts on the Tarmac, near the hangar, and obtained a challenge from his local Club to meet any six Aero Club "loopers, rollers or spinners." So nothing could be more complete. It is hoped that the challenge will be taken up immediately and with the true aviation spirit.

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THE ROYAL AIR FORCE MEMORIAL FUND

The first meeting in the New Year of the Executive Committee of the Fund was held at Iddesleigh House, on February 10. In the unavoidable absence of the Chairman, Lord Hugh Cecil, the chair was taken by Air Marshal Sir John Salmond, K.C.B.

The proof copies of the annual report had been circulated to members of the Committee a few days previously, and the annual report was approved, and the various accounts, as audited by Messrs. Blackburns, Barton, Mayhew and Co., chartered accountants, were likewise approved, and the report was ordered to be published in due course. It was reported that the Vanbrugh Castle School, for the orphans of airmen, opened for the Spring term on January 6, with 39 boys in attendance. In this connection the Committee approved of an additional sum of £500 being voted for necessary alterations and furnishings for the school. A further application for assistance, in an educational sense, from the Salting Benefaction (administered by the Fund) was approved by the Committee. The next meeting of the Committee was fixed for April 21 at 3 p.m.

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This Year's Paris Aero Show

It has been decided that the tenth International Aero Show will be held in the Grand-Palais, Paris, in November and December next.

R.A.F. Flying Accidents

The Air Ministry regrets to announce that as a result of an accident to a Bristol Fighter at Heliopolis, Egypt, on February 6, Flying Officer Arthur Cleverton Tremellen, the pilot of the aircraft, was killed, and Flight-Lieut. Sturley Philip Simpson was seriously injured.

On February 10, as a result of an accident to a machine of No. 402 Flight, Mediterranean Command, Lieut. Henry Roger Hancox, Royal Navy, Flying Officer, Royal Air Force, was seriously injured and died on the following day in the R.N. Hospital, Malta.

On February 12, as a result of an accident to a Vickers-Vimy at Winterslow, Salisbury, Wilts, Sqdn.-Ldr. Alfred George Horsley-Carr, O.B.E., was killed, No. 157835 Sergt. William Norman Pink, the pilot of the aircraft, being slightly injured and No. 329752 A.C. 2 Clifford Bartlett Cardall, uninjured.

THE R.A.F. IN IRAQ

We have on many occasions referred to the excellent work accomplished by the Royal Air Force in Iraq and the East; therefore we cannot refrain from quoting from an exceedingly interesting article by the special correspondent of the *Daily Telegraph* in Iraq, in which some important observations are made on this subject.

The *Daily Telegraph* Correspondent writes :—

"One cannot remain long among these mountains without being impressed by the importance of the Royal Air Force in their defence. Since October, 1922, the Air Vice-Marshal has been General officer commanding the military forces of the country, and some remarkable work has been accomplished. Aerodromes are to be found everywhere from Basra to Zakho. Out of a total of 43⅔ organised squadrons on the active list, 8 are stationed in Iraq, as against 6 in India and 4⅓ in Egypt, Palestine, and Transjordania. Only at home, where there are 25⅓ squadrons, is there a greater concentration, and out of a gross Air Vote for 1925–26 of £21,319,300, £2,744,100 goes to Iraq. The larger part of this sum would, of course, have to be spent, even if every machine were withdrawn, and there is no probability of the size of the air arm being reduced. The policy of expansion over a period of years necessitates the keeping up of at least the present strength, and these squadrons, if they were not here, would still have to be maintained.

"As a technical training centre the Air Vice-Marshal in Baghdad, Sir John Higgins, is convinced that Iraq affords uniquely valuable experience. Last year no fewer than 26,000 flying hours were recorded, and these included much long-distance flying, and were carried through with under ten casualties. One squadron actually recorded 504 hours in one month without casualties. Besides these reasons, the responsibility of having a whole country under its command for military purposes involves much useful routine work of organisation and administration such as the R.A.F. has never before been offered.

"From the point of view of the Service the experiment is thus admirable. It is equally advantageous from the point of view of the Civil Government, which is saved heavy expense. For Northern Iraq, owing to the inaccessibility of many of its villages, the absence of railways, the dubious excellence of the roads, and the unruliness of some of the tribesmen, is an extremely difficult country to keep tranquil. Much loose talk has been directed against the system of aerial bombing employed in refractory neighbourhoods, but to anyone who has experience of Kurdistan (where most of the trouble is located) this must seem at once the cheapest and the most humane way of restoring order. A few aeroplanes are able, after ample warning has been given, to impress unruly sheikhs with respect for authority without inflicting any loss of life, whereas otherwise a column would have to be sent out and expense and bloodshed incurred."

Personals

Married

Sandys Parker George, R.A.F., son of the late Rev. T. P. George and Mrs. George, Oxford, was married on January 29, at Bombay, to Winifred Marie, daughter of Mr. and Mrs. Wiles, Oxford.

Squadron-Leader J. Leacroft, M.C., was married on February 2, at Nice, to Miss Gladys Cuddon.

To be Married

The engagement is announced between Reginald Newman Coles, R.A.F., only son of Mr. and Mrs. Samuel Coles, of Erdington, Birmingham, and Winifred Ethel, youngest daughter of Mr. and Mrs. John Bastick, of Stockland Green, Birmingham.

The engagement is announced between Leonard Gordon Davies, late R.F.C., second son of Mr. and Mrs. Herbert Davies, of Pinner View, Harrow, and Marguerite Ingeborg, younger daughter of the late H. R. Woolrych, M.A., and Mrs. Woolrych, of Radcliffe Gardens, S.W.

The marriage between Air Commodore Felton Vesey Holt, C.M.G., D.S.O., and Miss Mollie Dugdale, will take place at St. Peter's Church, Eaton-square, on Tuesday, March 9.

The engagement is announced between Flight-Lieut. T. P. York Moore, R.A.F., youngest son of Dr. York Moore, 12, The Avenue, Surbiton, and Rowena, eldest daughter of Maj. Sampson-Way, Manor House, Henbury, Glos.

Item

Mrs. T. O. Lyons and family wish to thank all who so kindly sent flowers and expressions of sympathy in their bereavement on the death of the late Wing-Commander T. O. Lyons, O.B.E.

Air Vice-Marshal Sir Vyell and Lady Vyvyan recently arrived in Cairo on a short visit.

Killed

Squadron-Leader Alfred Horsley-Carr, who was accidentally killed while flying at Porton, near Salisbury, was the eldest son of Mr. and Mrs. William Carr, of Barnsley, Yorkshire.

Spanish Transatlantic Flight

When Comandante Franco arrived at Buenos Aires on February 10—it appears that he did not resume the flight right away from Montevideo, as reported last week, but rested several hours before continuing—he was accorded a most enthusiastic welcome from land, sea and air. After circling the city he landed in the river and was then received by President de Alvear. The King of Spain has conferred the Golden Key (which carries the rank of Chamberlain) on Comandante Franco, Capt. Ruiz de Alda, and Ensign Duran, as a personal mark of the royal pleasure at the success of the flight to Argentine. On behalf of the British contribution towards the success of this flight, we are glad to be able to state that Comandante Franco's return to Rio de Janeiro was *not* caused by engine trouble. We very much regret, however, having omitted last week to couple the names of Napier and Titanine with that of Marconi—for, of course, as we had previously reported, the Marconi (British) wireless installation fitted to the Dornier-Wal played a very important part during the flight.

Another Spanish Flight

It is reported that two Spanish aviators, Sen. Loriga and Estevez, are preparing for a flight of 15,000 miles from Spain to the Philippine Islands in a Spanish-built machine fitted with two Rolls-Royce "Condor" engines.

Italian Transatlantic Flight Abandoned.

Sig. Casagrande has been forced to abandon his attempt to fly from Italy to South America on a Savoia twin-engined monoplane flying-boat. It will be remembered that Sig. Casagrande damaged his machine at Casablanca, and a representative of the Savoia firm has made an examination of the machine and states that it cannot be repaired at Casablanca. It is, therefore, to be dismantled and sent back to Italy.

VARNISHES, PAINTS & ENAMELS FOR AEROPLANES

Oct. 8, 1924.

". . . . One of our twin-engined W.8 machines, which has been used on the London-Paris Service for the last three years and done 1,500 hours of flying, has just been returned to our Works for inspection and overhaul. The whole of the woodwork inside the planes, which have had their fabric removed, is varnished with your material. It will probably be of interest to you, therefore, from a publicity point of view to see the state of the varnish at the end of this period, the surface of the varnish being practically as good as new, except in one or two places where moisture has collected."—(*Signed*) HANDLEY PAGE, LTD.

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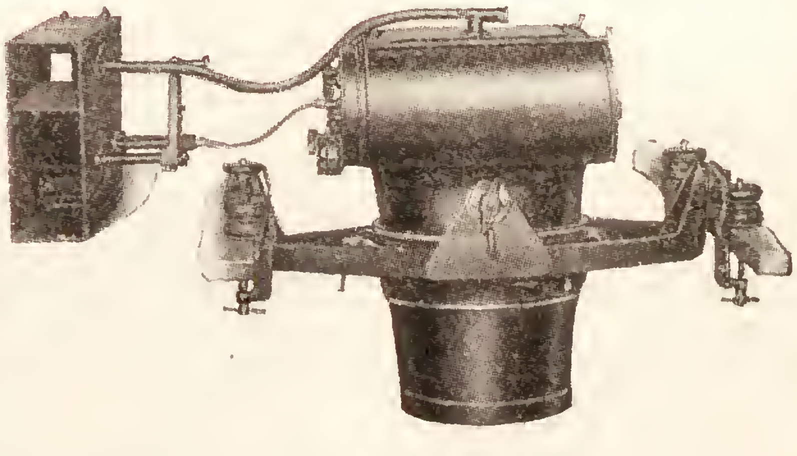

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450 × 60	30	89.	31.75	Central
"	172	130.	38.09	Central
575 × 60	21	160.	28.	Central
"	186	120.	34.92	Central
"	190	150.	38.09	Central
650 × 65	78	178.	44.45	132/46
"	79	178.	44.45	Central
"	100	178.	38.09	132/46
"	101	178.	31.75	132/46
600 × 75	21	160.	28.	Central
"	186	120.	34.92	Central
"	190	150.	38.09	Central
700 × 75	78	178.	44.45	132/46
"	79	178.	44.45	Central
"	100	178.	38.09	132/46
"	101	178.	31.75	132/46
700 × 100	77	178.	44.45	132/46
"	92	185.	55.	135/50
"	95	185.	55.	Central
"	99	178.	38.89	132/46
700 × 100	112	150.	38.09	Central
"	176	178.	44.45	Central
"	179	178.	55.	132/46
650 × 125	119	178.	55.	132/46
"	147	178.	55.	Central
"	188	120.	34.92	Central
750 × 125	77	178.	44.45	132/46
"	92	185.	55.	135/50
"	95	185.	55.	Central
"	99	178.	38.89	132/46
"	112	150.	38.09	Central
"	176	178.	44.45	Central
"	179	178.	55.	132/46
800 × 150	161*	185.	55.	135/50
"	162*	185.	55.	Central
"	163*	185.	66.67	135/50
"	169†	185.	55.	135/50
"	177	185.	55.	135/50
"	183	185.	55.	Central
"	211*	185.	60.32	135/50
1000 × 150	167	185.	55.	125/60
"	174	250.	80.	Central
"	182	185.	55.	Central
1000 × 150	187	220.	66.67	Central
"	201	185.	60.32	125/60
"	210	185.	60.32	Central
1000 × 180	148	220.	80.	Central
"	149	185.	55.	Central
"	155	220.	66.67	Central
"	166	185.	55.	125/60
900 × 200	107	185.	55.	Central
"	108	185.	55.	125/60
"	128	220.	66.67	Central
"	137	250.	80.	Central
"	157	185.	80.	Central
"	202	185.	60.32	Central
1100 × 220	134	220.	66.67	Central
"	136	250.	80.	Central
975 × 225	192	185.	60.32	Central
1250 × 250	133	250.	80.	Central
"	154	304.8	101.6	Central
1500 × 300	115	304.8	101.6	Central
"	126	304.8	152.4	Central
1750 × 300	139	400.	152.4	Central
"	191	350.	150.3	Central

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(346)

THE CAPRONI "CA 70" BIPLANE

A New Italian Ground Strafing Machine

We give below some brief particulars, together with illustrations, of one of the recent military machines produced by the famous Italian aircraft constructing firm Societa Italiana Caproni, of Milan.

The Caproni "Ca 70" possesses several noteworthy features, visibly apparent as well as otherwise. As regards the former, as will be seen from the accompanying illustrations, the outstanding features most noticeable consist of the fuselage and the arrangement of the wings. The other features are centred around certain constructional details—and here, unfortunately, we have little information at our disposal—and the fact that this particular model is fitted with a 400 h.p. Bristol "Jupiter" engine. It will be remembered that we published in Flight for September 17, 1925 a description of another Caproni machine fitted with Bristol "Jupiters"—the Caproni 80 night bomber.

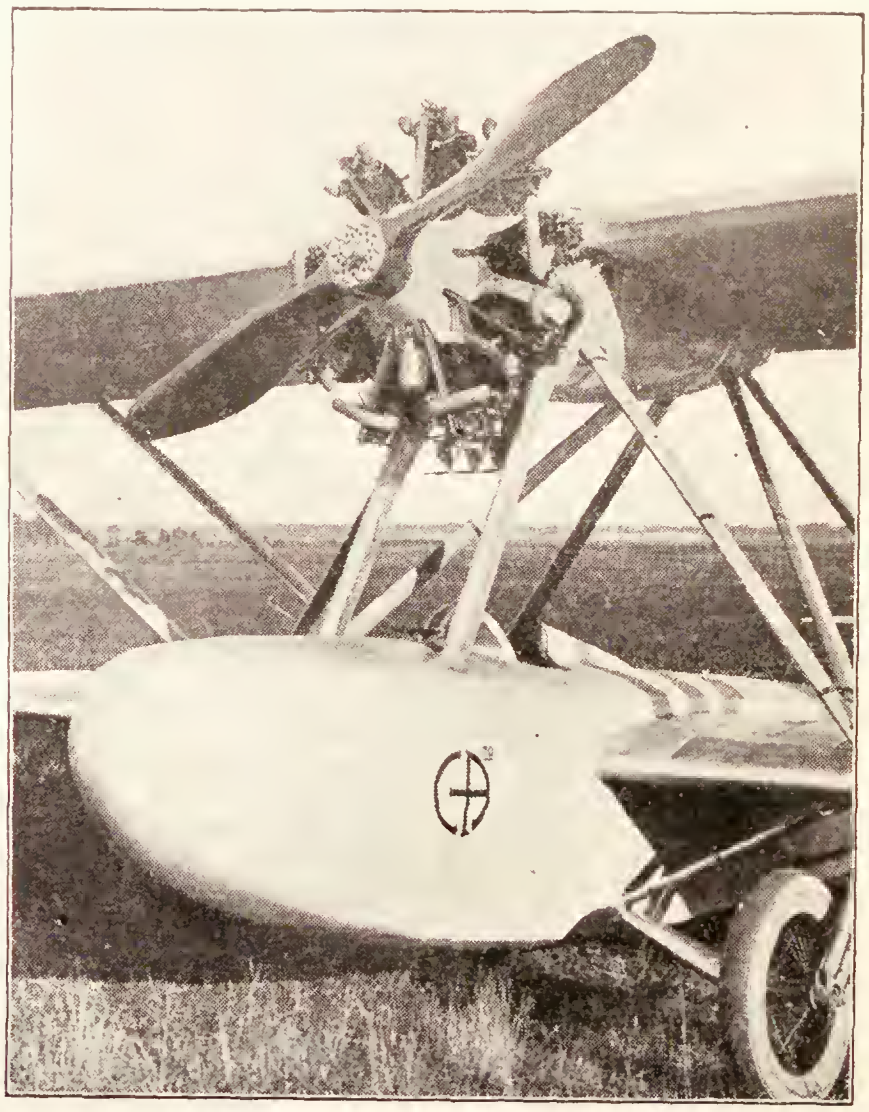
In some ways the Caproni "70" is a smaller version of the "80," except that it is a single-engined machine and that its top plane is much larger than the bottom one—exactly opposite to the arrangement adopted in the "80." The "70" is intended for co-operation with the infantry at low altitudes—ground strafing—or it can also be employed as a night fighter. For either purpose, it possesses great advantages, mainly on account of the excellent field of vision its general lay-out provides

Like in the Caproni "80," it will be observed that the "fuselage" is designed on the lines of a flying-boat hull, and is similarly disposed. The "70" is, however, strictly a land machine, and is fitted with a somewhat unusual type of landing gear. Details of the latter are lacking, but as far as we can gather each wheel (there are two) is carried by a stout "semi-axle" hinged to the side of the "hull" and raked slightly forward; then from the wheel hub a shock-absorbing device extends up to the lower plane, at the point of attachment of the front interplane strut. There is also a radius strut extending rearwards from the wheel hub up to the rear spar of the wing.

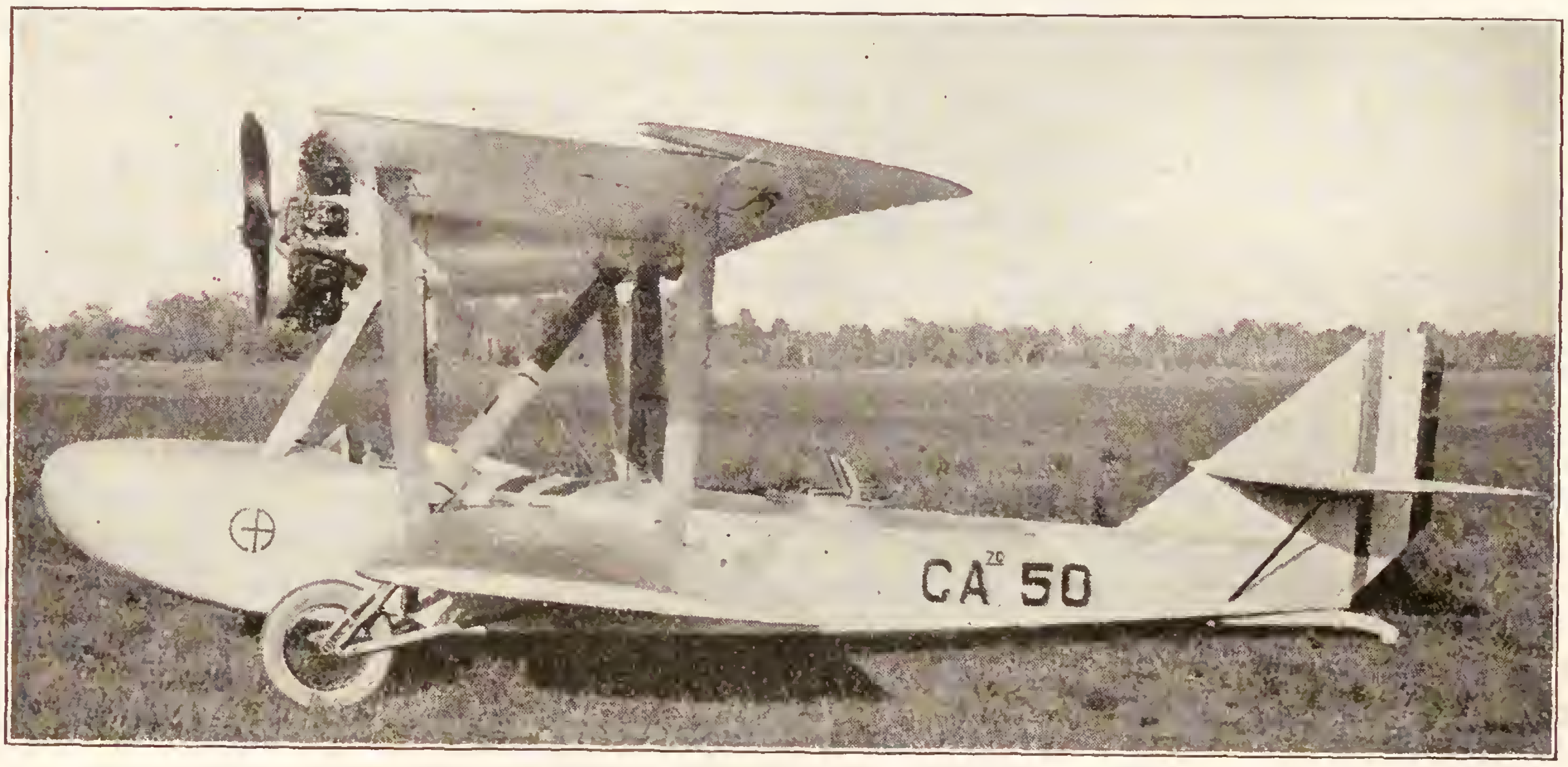
The "hull" is of good streamline shape, of comparatively narrow and not very deep rectangular cross section. The pilot's cockpit is located just forward of the wings, and immediately beneath the engine. Half-way along the "hull," and well clear of the wings, is the observer's or gunner's cockpit, which is provided with two machine guns—one mounted on a gun ring on the cockpit mouth, and the other mounted in the floor of the cockpit, firing downwards and rearwards. Two other machine guns are carried, one firing forward through the nose of the "hull" and the fourth firing downwards and forward.

This machine being intended for ground attack, it is armoured with Poldi steel—but whether this is confined to the body only we cannot say.

As previously stated the top plane is considerably larger than the lower one, as regards span, but equal in chord. Both are without dihedral angle. The top plane is supported by two pairs of N struts attached to the lower plane a short distance from the body. These struts, together with another pair extending up from the body, also serve to carry the engine. From the lower attachments of the N struts a pair of interplane struts extend outwards up to the top plane, and except for the incidence bracing on these latter truts there is no other external wire bracing.



THE CAPRONI "CA 70": A "close-up" showing the mounting of the 400 h.p. Bristol "Jupiter" engine above the boat-like body.



THE CAPRONI "CA 70": Side view of a recent production of the Italian Caproni firm. It is a land machine intended for ground strafing or night fighting, and is fitted with a Bristol "Jupiter."

Balanced ailerons are fitted to the top plane only, while the horizontal tail surface and elevators are mounted midway up the vertical fin and therefore well above the stern of the "hull."

The Bristol "Jupiter" engine is mounted in a neat streamlined nacelle attached to, and flush with, the underside of the top plane centre section. It is located in front of the plane and drives a tractor screw.

The main characteristics of the Caproni "Ca.70" are:—

Span (top)	14 m. (45 ft. 11 ins.).
Span (bottom)	8 m. (26 ft. 3 ins.).
Chord	2·50 m. (8 ft. 2 ins.).
Area of main planes	55 sq. m. (593 sq. ft.).
Weight empty	1,310 kgs. (2,888 lbs.).
Useful load	820 kgs. (1,808 lbs.).
Weight laden	2,130 kgs. (4,696 lbs.).
Wing loading	38·7 kgs./m² (7·9 lbs./sq. ft.).
Power loading	53 kgs./h.p. (11·7 lbs./h.p.).
Speed range	90-200 k.p.h. (56-124 m.p.h.).
Safety factor	10.

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Vacancies for Royal Air Force Apprentice Clerks

The Air Ministry announces: Sixty vacancies exist in the Royal Air Force for well-educated boys, between the ages of 15½ and 17, to enter as apprentice clerks. Approximately forty of the posts will be filled by means of an open competition, which will be held by the Civil Service Commissioners at various centres in April, and the remaining twenty by direct entry of boys who have obtained an approved school certificate. Successful candidates will be required to engage for a period terminating twelve years after reaching the age of 18, with the possibility of re-engaging to complete time for pension. Detailed information regarding the apprentice scheme can be obtained from the Inspector of Recruiting (Apprentice Clerks), 4, Henrietta Street, Covent Garden, London, W.C.2. Boys entered under this scheme undergo a two years' course of training in clerical duties, typewriting, shorthand, bookkeeping and practical office routine, during which time their general education is continued under qualified schoolmasters. The apprentices are paid 7*s.* per week for the first year and 10*s.* 6*d.* per week afterwards until they have both attained the age of 18 and have been posted for duty after passing their final examination, when they receive pay of at least 21*s.* per week. A number of the boys who pass out well are appointed as leading aircraftmen, with commencing pay of 31*s.* 6*d.* per week. In addition, there is later in their career the possibility of volunteering to become sergeant pilots.

Berlin-Tokyo Air Service

According to reports from Moscow plans have been completed for a regular air service between Berlin and Tokyo, via Moscow. A German company will operate the section Berlin-Moscow, then passengers and goods will be conveyed by other machines, calling at Omsk, Irkutsk and Vladivostok, the complete journey occupying about 50 hours.

British Air Enterprise in Czecho-Slovakia

Negotiations are in progress between the Aircraft Operating Co. and the Czechoslovak Government regarding the formation of a company in Prague, which will operate air lines from Prague to Belgrade and Trieste.

Dancing at Hawker's

The Hawker staff held their annual dance at Kingston on February 9. A fully representative gathering of directors, staff and guests had a very enjoyable time, and voted the function a huge success. Among those present were Mr. and Mrs. T. O. M. Sopwith, Mr. and Mrs. F. Sigrist, Mrs. Hawker, Mr. and Mrs. F. I. Bennett, Mr. and Mrs. F. S. Spriggs, Maj. and Mrs. MacMahon, Maj. and Mrs. Buchanan, Maj. and Mrs. Bishop, Maj. and Mrs. Kilmayer, Mr. and Mrs. Burroughes, Mr. and Mrs. P. M. Muller, Mr. John Lord, Mr. and Mrs. Broadbent, Mr. and Mrs. S. Camm, Mr. St. Barbe, Flight-Lieut. and Mrs. Bulman. The arrangements were in the hands of Mr. F. S. Spriggs, which is equivalent to saying that they were perfect.

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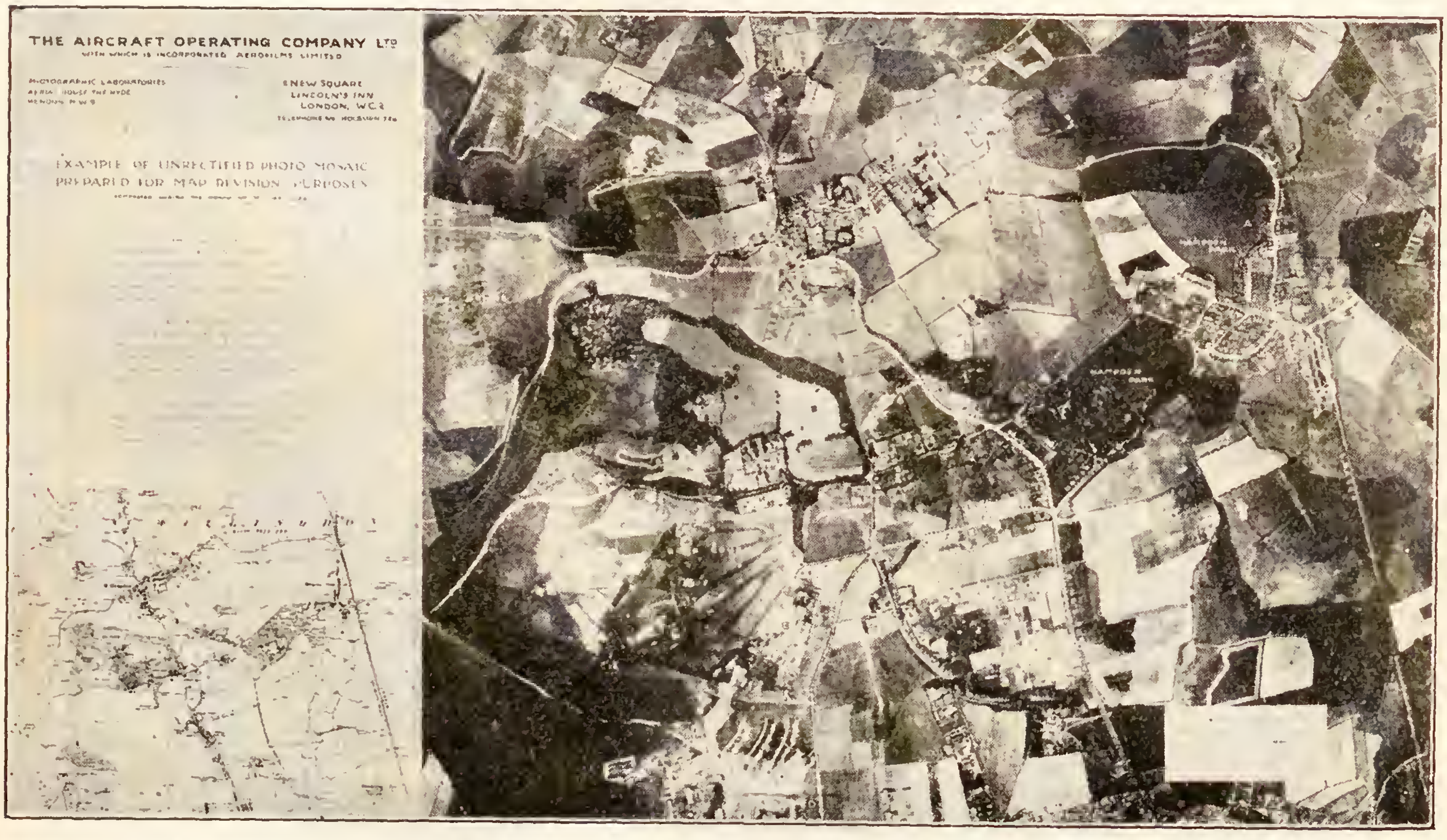
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EXAMPLE OF UNRECTIFIED PHOTO MOSAIC
PREPARED FOR MAP REVISION PURPOSES

AERIAL MAP-MAKING: We show above a photograph of a mosaic of a portion of the area at Eastbourne, of which the Aircraft Operating Co., Ltd., have been taking aerial photographs under contract with the Ordnance Survey Department. Of course, a lot of the detail is lost in the reproduction and reduction. The actual size of the mosaic is 2 ft. 6 in. by 3 ft. 6 in.

AIRCRAFT
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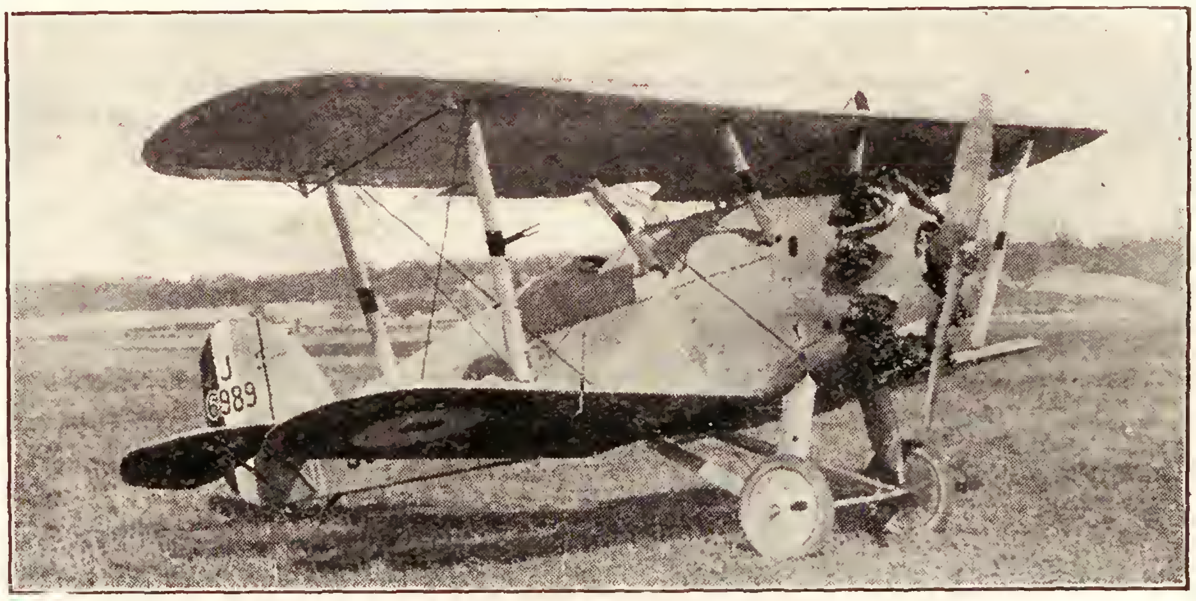

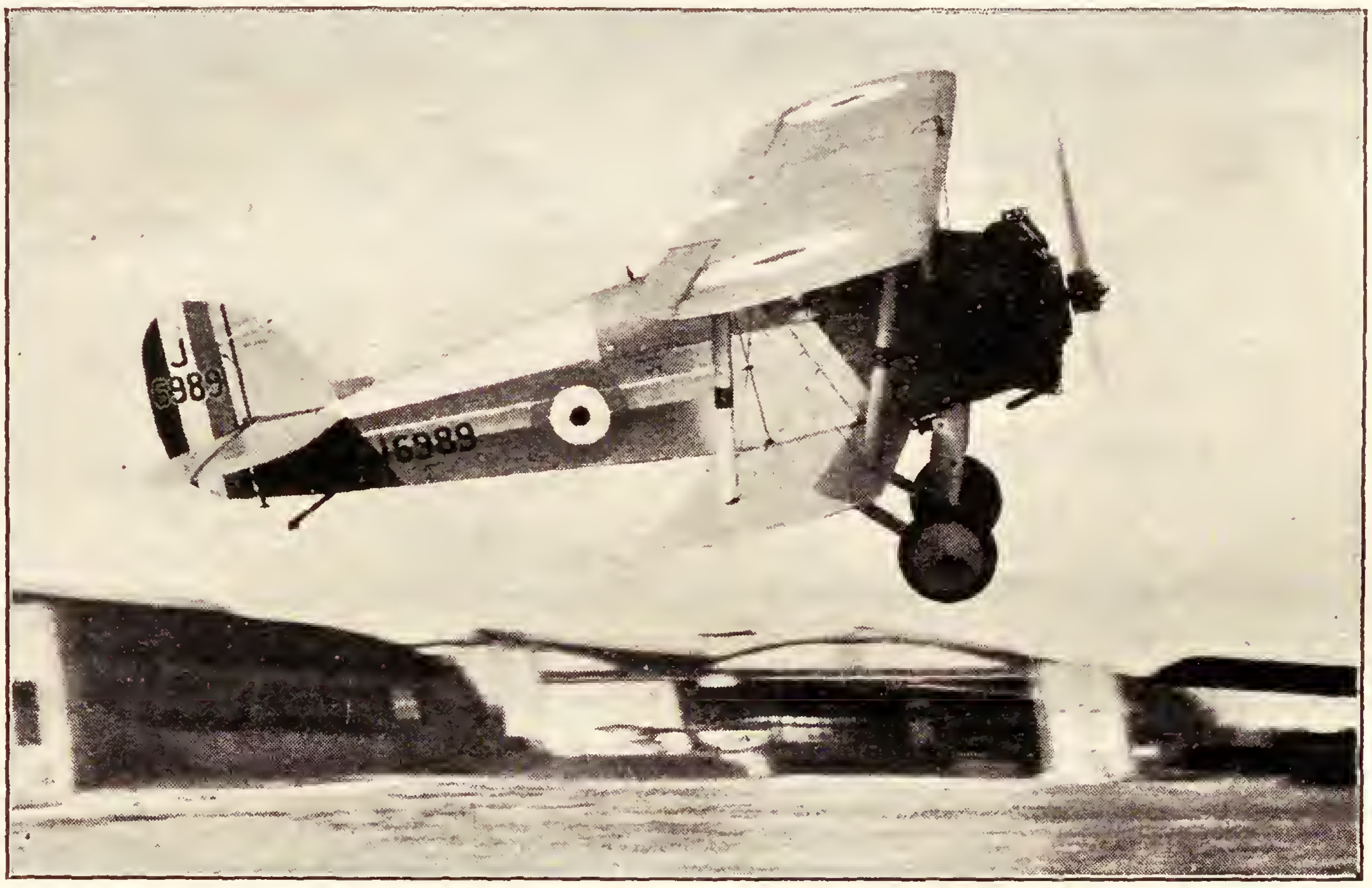

THE "HERON" S.S. FIGHTER WITH "JUPITER" ENGINE. [FLIGHT *photographs*

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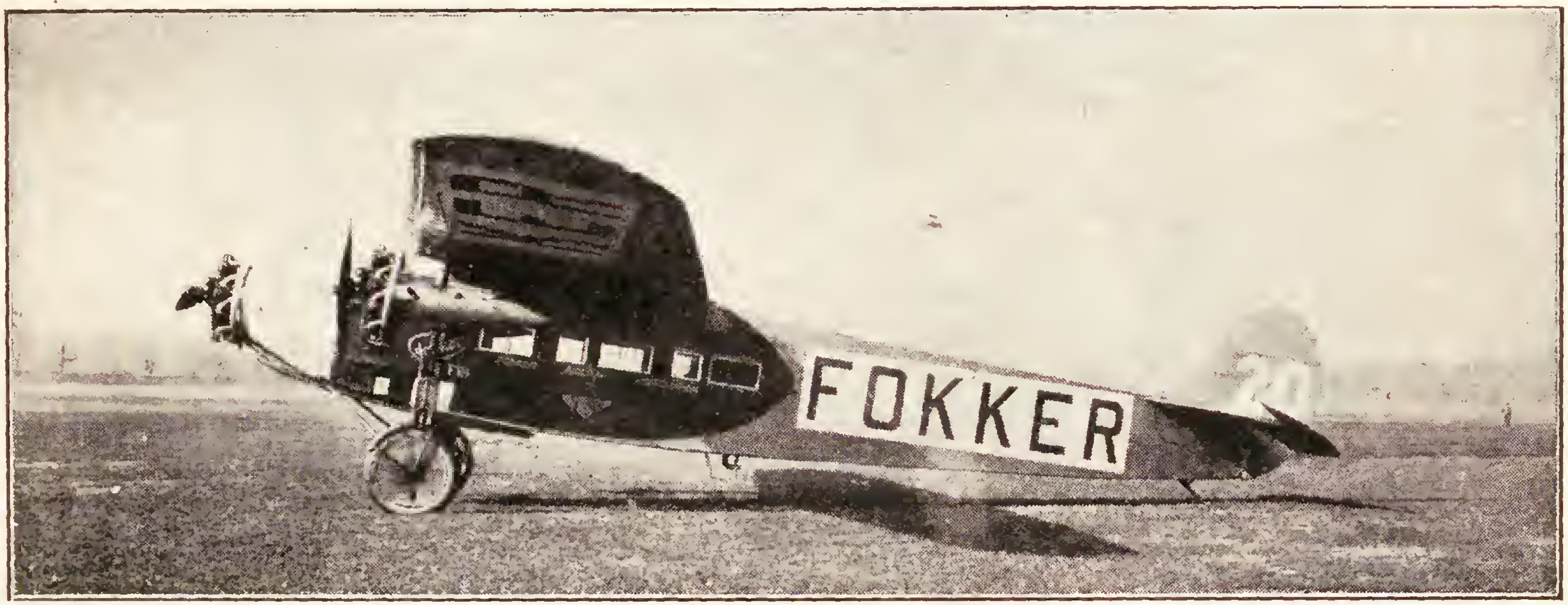

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WILL FLY AND CLIMB ON ANY TWO ENGINES WITH FULL LOAD.

The following remarks are extracted verbatim from the official report issued by the Engineering Division of the Army Air Service, at McCook Field, Dayton, Ohio, on the tests carried out with the Fokker F.VII-3m.

"The airplane returns to a normal level position when left to itself in a side slip or glide."

"There is no tendency to spin at the stalling point or with abrupt use of the controls. It retains controllability at the stalling point. The airplane does not stall of its own accord."

"In a glide it is possible to change direction by the use of the rudder only."

"The ailerons are easy to move at both high and low speeds. The airplane responds readily to the ailerons at all speeds."

"The cockpit is accessible and comfortable. The pilots are protected against the wind. It is unnecessary to wear goggles while flying."

N. V. NEDERLANDSCHE VLIEGTUIGENFABRIEK,

AMSTERDAM - HOLLAND.

AMERICAN AERONAUTICS

Eleventh Annual Report of the American National Advisory Committee for Aeronautics

ALTHOUGH it contains administrative reports only, and not the technical reports, there is much in the eleventh annual report of the American National Committee for Aeronautics, just published, to interest British readers. It would obviously be impossible for us to publish the report in full, nor would such publication be of any great interest, but in the following abstracts and summaries will be found, we trust, most ot the items of particular interest to British readers.

The Eleventh Annual Report covers the year 1925, and it is somewhat significant that a copy of it should reach Great Britain already during January, 1926. The Americans are "hustlers" in most things, and their Research Committee is evidently no exception to the rule.

Before dealing in detail with some of the reports given, it may be of interest to give a brief outline of the history and organisation of the American National Advisory Committee. The Committee was established by Act of Congress in 1915. Under American law the Committee holds itself at the service of any department or agency of the American Government interested in aeronautics for the furnishing of information or assistance in regard to scientific or technical matters relating to aeronautics, and in particular for the investigation and study of fundamental problems submitted by the War and Navy Departments. The Committee may also exercise its functions for any individual, firm, association or corporation within the United States, provided such individual or firm defray the cost involved.

The Committee institutes research, investigation, and study of problems which are needful and timely for the advance of the science and art of aeronautics in its various branches, and keeps itself advised of the progress made in research and experimental work in aeronautics in all parts of the world, particularly in England, France, Italy, Germany, and Canada.

The information thus gathered is brought to the attention of the various sub-committees for consideration in connection with the preparation of programmes for research and experimental work in America. This information is also made available promptly to the military and naval air services and other branches of the government, and such as is not confidential is immediately released to university laboratories and aircraft manufacturers interested in the study of specific problems, and also to the public.

The committee has 12 members, appointed by the President of the United States. Two members represent the War Department, two the Navy Department, one the Smithsonian Institute, one the U.S. Weather Bureau, and one the U.S. Bureau of Standards. The law provides that not more than five additional members acquainted with the needs of aeronautical science shall serve on the committee. Incidentally it may be mentioned that the law of the United States provides that all members as such shall serve without compensation.

Sub-Committees

The executive committee has organised six standing sub-committees, three administrative and three technical. It is with the latter that we are most concerned here. The three technical sub-committees deal with aerodynamics, power plants for aircraft, and materials for aircraft respectively. The headquarters of the American N.A.C.A. are located in the Navy Building, Seventeenth and B Streets N.W., Washington, D.C., and the administrative office is also the headquarters of the various sub-committees. The scientific investigations authorised by the N.A.C.A. are not all conducted at the Langley Memorial Aeronautical Laboratory, but the facilities of other government laboratories and shops are utilised, as well as the laboratories connected with institutions of learning, whose co-operation in the scientific study of specific problems in aeronautics has been secured.

The Langley Memorial Aeronautical Laboratory

The greater part of the research work of the committee is conducted at the Langley Memorial Aeronautical Laboratory, which is situated at Langley Field, Virginia. Langley Field is one of the most important and best equipped stations of the U.S. Army Air Service, occupying about 1,650 acres and having hangar and shop facilities for the accommodation of four bombing squadrons, a service squadron, a school squadron, and an airship squadron. In the laboratory and flying field, or air station as we should term it, fundamental problems of scientific research are investigated. The laboratory is organised with five subdivisions: power plants division, wind tunnel division, flight test division, technical service division, and property and clerical division.

On June 25, 1925, the committee authorised the construction of propeller research equipment large enough to investigate full-size propellers. The test chamber is of sufficient size to accommodate the fuselage of an aeroplane, on which the propeller is mounted and operated by the aeroplane engine. The throat of the test chamber is 20 ft. in diameter, and the actual air speed obtainable is 100 m.p.h. Last year the research flight work was carried out with the aid of 19 aeroplanes, which made a total of 626 flights, approximating 245 hours' total flying time.

Office of Aeronautical Intelligence

A department which has no exact counterpart in this country is the Office of Aeronautical Intelligence, which is situated at headquarters in Washington, D.C. This was established in 1918, its functions being the collection, classification and diffusion of technical knowledge on the subject of aeronautics. In other words, this office is the officially appointed government depository for scientific and technical reports and data on aeronautics.

To handle the work of securing and exchanging reports in foreign countries the committee maintains a technical assistant in Europe, whose headquarters are at 18, Rue Tilsitt, Paris. The present Technical Assistant in Europe is Mr. John Jay Ide, of New York. It is the duty of the technical assistant in Europe to visit personally the government and private laboratories, centres of aeronautical information and private individuals in England, France, Italy, Germany and other European countries, and to endeavour to secure for America not only printed matter which would in the ordinary course of events become available in that country, but more especially to secure advance information as to work in progress, and any technical data not prepared in printed form, and which would otherwise not reach America.

To give some idea of the work carried out by the American Office of Aeronautical Intelligence it may be mentioned that last year that office distributed no less than 35,884 technical reports.

Reports of Technical Committees

It is not possible for us, in the space available, to deal at all exhaustively with the reports of the three technical sub-committees, but the following brief references may be of interest.

In the Aerodynamics Sub-Committee's report it is stated that the committee on aerodynamics has direct control of the aeronautical research conducted at Langley Field, the propeller research conducted at Stanford University, and a number of special investigations conducted at the Bureau of Standards. The aerodynamic investigations undertaken at the Washington Navy Yard, the engineering division of the Army Air Service at McCook Field, the Bureau of Standards and the Massachusetts Institute of Technology are reported to the committee on aerodynamics.

At the *Langley Memorial Aeronautical Laboratory* the greater part of the research work was carried out, and we can but refer to a few tests that seem of special interest to readers of FLIGHT. Concerning tests on aerofoils it is interesting to find the statement that pressure distribution measurements on three thick aerofoils have been completed, and that as one of the results of this research, a new thick wing section has been designed and its air forces measured. The results of tests on this new section show a considerable gain in aerodynamic efficiency, and the report states that a very undesirable property common to most tapered wings has been eliminated. Most tapered aerofoils, it is stated, have the root section and the tip section parallel, or occasionally the tip is "washed-out." This results in an aerofoil with a changeable angle of zero lift along the span, and consequently when the total lift is zero the air force on the tips is downwards, and that at the middle section is upwards. In the new design the wing has been sufficiently "washed-in" to bring all sections simultaneously to zero lift.

Concerning tests on model aeroplanes, it is stated that one of the most interesting problems of the year was the investigation of a model of a training type of machine. This aeroplane had exhibited somewhat unusual characteristics in that it progressed from a normal spin into a flat one, from which recovery had sometimes been impossible. Tests of the model in the wind tunnel showed that a reduction of gap, accompanied by an upward and forward shift of the centre of gravity, served to eliminate this tendency, and it is believed that under these conditions the controls would be sufficiently effective to prevent the machine entering the flat spinning condition.

Of particular interest to British readers, because no such equipment exists in this country, are the tests carried out in the American variable density wind tunnel designed by Dr. Max Munk. The report states that a series of aerofoils has been tested in this tunnel at a high Reynolds number. The 27 sections tested were derived from Dr. Munk's theory of the aerofoil, such that the travel of the centre of pressure would be small. The test results are stated to have shown remarkable agreement with the theory, and in particular demonstrated clearly that the coefficient of pitching moment about a point at 25 per cent. of the chord is practically constant, which is predicted by the theory.

In connection with the research on the U.S. Army Air Service (Sperry) Messenger aeroplane, a group of aerofoils were tested at five different tank pressures, from a low to a high Reynolds number. Besides obtaining results comparable with full-scale conditions, information was obtained as to the variation of the aerofoil characteristics with scale or Reynolds number. In general, the report states, the minimum drag coefficient decreases as the scale is increased. The maximum lift/drag ratio increases in the same manner, though to a lesser extent. The scale effect of the maximum lift coefficient differs considerably for different aerofoils, and as yet no general rule can be stated as to its true scale effect. Tests are now in progress on a series of biplane cellules using aerofoils of the R.A.F. 15 section, with several gap/chord ratios. A test of a model of the Fokker D-VII was made at a Reynolds number very close to full scale, and from a computed performance remarkable agreement with that of flight tests of the full-size aeroplane was found.

A certain amount of airship research has also been carried out during the past year. The information obtained as a result of the investigation of pressure distribution on the hull and tail surfaces of a non-rigid airship has been studied, analysed and tabulated. The data thus available cover the pressures experienced at the 400 points investigated in nearly all possible manœuvres. While the results showed that the pressures and loadings resulting from manœuvres were never in excess of those used in design computations, they indicated, however, that those experienced in bumps and gusts were probably very much larger, and might exceed the design factors in use at the present time.

Concerning aerodynamic theory the interesting statement is found that last year's progress in fundamental aerodynamic theory has been substantiated throughout the present year, and that its application to practice has been demonstrated and further light thrown on its derivation, and on its relation to other branches of technical mechanics. All experiments made to check the important theory were successful and showed very good agreement. Within the useful range of angle of attack of an aerofoil, the lift and air force moment computed agreed in a very satisfactory way with the values observed in experiments.

The theory was used to lay down a series of wing sections, all distinguished from ordinary wing sections by a characteristic of great practical value, *i.e.*, the absence of travel of the centre of pressure. Not only did the wind tunnel tests confirm this anticipated stability of the wing section, but some of the sections also proved to be good wing sections in respects other than stability, so that it is considered that the new theory has directly led to an improvement of wing section design. The report states that the variable density wind tunnel has so far substantiated expectations, and has not yet shown any indication of scale effect at tests made at full Reynolds number.

At the *Stanford University* work has been confined mostly to propeller research. This laboratory is now beginning two new researches which should be of considerable interest. These are: (1) tests on a group of metal propeller models with adjustable blades and representing 31 different propellers; (2) tests on a complete model carried out concurrently with tests of the actual machine in flight, the model being tested with three different metal propeller models.

At the *Washington Navy Yard* a considerable amount of routine work in the form of aerofoil tests has been carried out. Among the tests were a series of six aerofoils in which the effect of various forms of cut-outs in the centre of the span was investigated. The results indicate that the conventional form of cut-out is probably the most satisfactory.

A considerable amount of research on control surfaces has also been carried out at the Washington Navy Yard, and it is interesting to find that some of the experiments related to trailing edge flaps for reducing the landing speed as well as supplying lateral control.

In the course of a study of vibration of tail surfaces in certain types of aeroplanes, a series of tests were made which shed considerable light on the fundamental causes of vibration and flutter. The technical report on these tests, which will doubtless be issued soon, should be of interest to all aircraft engineers.

At the *Bureau of Standards* a variety of researches was carried out, and we have not space to refer to these in detail but it is of interest to find that measurements have been made of the pressure distribution for six aerofoils, ranging in camber ratio from 0·10 to 0·20 at speeds from 0·5 to 1·08 times the speed of sound. The measurements were made in a free air stream 2 in. in diameter, using aerofoils of 1 in. chord length. An analysis of these results is stated to be in progress.

Of the work carried out at the *Massachusetts Institute of Technology* the most interesting appears to have been the installation and test of the propeller dynamometer in the 7½-ft. wind tunnel. The dynamometer was designed for the particular purpose of testing propellers and models in the presence of each other and measuring the interference between them, and is so designed as to permit of making such interference tests at any angle of attack. The model under test is supported on wires, and the three forces and three moments acting are all read simultaneously by six identical automatic balances from which the wires depend. Readings for all forces and moments can be obtained in about 5 seconds after the model has been adjusted to the correct attitude.

McCook Field, as is well known, corresponds fairly closely to our Royal Aircraft Establishment, and carries out a great variety of researches. During the past year the routine work has included complete tests on 13 aeroplane models, with a rather elaborate investigation of the effect of fuselage, chassis, tail surfaces, etc., determined by successive removal of these parts from the model.

(*To be concluded.*)

ROYA AERONAUTICAL SOCIETY NOTICES.

Change of Lecture.—The attention of Members of the Society is drawn to the change of lecturer for Thursday, February 25. As Mr. A. J. Cobham will not be back from Africa in time, Flight-Lieutenant H. Cooch has consented to read his paper "On Landing Aeroplanes in Fog," on February 25, instead of March 18. It is hoped by that time Mr. Cobham will be back in England to read his paper.

The paper by Flight-Lieutenant Cooch is an important one, and describes the research work which has been carried out to solve the difficult problem of landing in fog and similar adverse conditions. Considerable headway has been made towards the solution of the problem, which is one of great importance to make flying under all conditions safe and successful in this country.

The lecture will be read at 6.30 p.m. in the Library at 7, Albemarle Street, W.1.

J. LAURENCE PRITCHARD, Hon. Secretary.

R.A.F. (Scottish) Reunion Dinner

THE Royal Air Force (Scottish) Reunion Club is holding its third annual dinner at Ferguson and Forrester's Restaurant, Buchanan Street, Glasgow, on March 5, at 7.30 p.m. This has previously been a very successful function, and this year it is hoped to raise a greater number attending than ever. The tickets are 8*s*. 6*d*. each, and can be obtained from the Hon. Sec. A remittance covering the number of tickets required should be enclosed with the application to the Hon. Secretary, 191, Sandy Road, Renfrew, N.B.

Fine South African Flight

MAJ. MENTJES and Lieut. Ross, of the S.A. Air Force, recently completed a fine non-stop flight between Pretoria-Durban-Pretoria (1,200 miles) on a D.H.9, remaining in the air for 13½ hours.

New Mooring Mast at Cardington

THE new mooring mast for airships has just been completed at Cardington. It is built of steel trellis work and is nearly 200 ft. high. The huge airship shed at Cardington is nearing completion.

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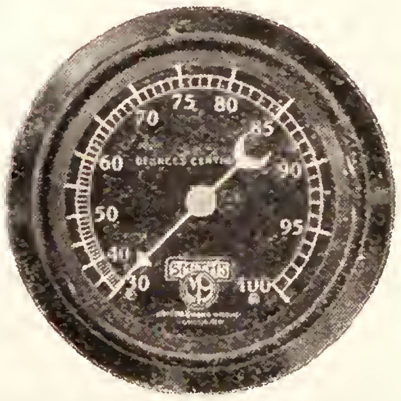

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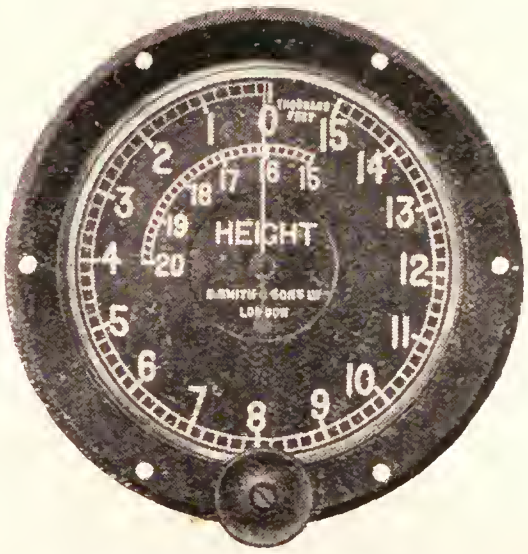

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THE ROYAL AIR FORCE

London Gazette, February 2, 1926

Reserve of Air Force Officers

The following are granted commns. in Class A.A., General Duties Branch, as Pilot Officers on probation :—K. P. L. Bowen, V. Schofield, J. H. A. Wells ; Jan. 18. D. Abbott, N. M. Browning ; Jan. 19.

The following are confirmed in rank, Jan. 28 :—Flying Officer H. W. Smith ; Pilot Officers J. Gallacher, H. Tulloch.

Flying Officer G. C. Sclater is transfd. from Class A to Class C ; Jan. 30. The following are transfd. from Class B to Class C :—Flying Officers : J. Durward ; Jan. 30. G. L. G. Watson, M.M. ; Feb. 2. Observer Officer : B. J. Paget ; Jan. 30.

The following Flying Officers resign their commns :—V. W. Burgess, A.F.C. Feb. 2. D. Davidson ; Jan. 10.

London Gazette, February 9, 1926

General Duties Branch

The following are granted permanent commns. in the ranks stated (Jan. 1):—*Flight-Lieut.* C. H. Cahill. *Flying Officer* A. F. James.

The following Pilot Officers are promoted to the rank of Flying Officer :—P. S. Blockey ; Jan. 15. A. C. H. Sharp ; Jan. 16. H. C. V. Jolleff, J. H. Sender, C. Clarkson ; Jan. 30. J. H. McC. Reynolds, R. Ll. R. Atcherley, J. Warburton, A. B. Kay, J. A. T. Ryde, H. H. Brookes, L. R. W. Tillard, F. W. M. Matthews ; Jan. 31.

The following Pilot Officers on probation are confirmed in rank :—P. E. Berryman, J. W. Busteed, G. P. Butcher, H. A. S. Byrne, E. H. Collinson, M.C. (Maj., E. Surrey Regt., R.A.R.O.), H. V. Crowder, F. G. H. Ewens, J. A. Hawkings, L. M. S. Knight, C. A. C. Patton, E. C. L. Richardson, W. L. Robertson, W. J. M. Spaight, I. R. Sweeting, W. S. Townend, P. G. Tweedie, R. C. Whitle ; Jan. 7. A. J. Ll. Hughes ; Jan. 13. A. P. Wayte ; Feb. 5.

The following Flight-Lieutenants are placed on half-pay, Scale B :—C. McM. Laing, M.C., A.F.C. ; Jan. 31. F. L. Luxmoore, D.F.C. ; Feb. 20. Flying Officer G. R. Burge is transferred to Reserve, Class C ; Feb. 10. The short-service commns. of the following Pilot Officers on probation are terminated on cessation of duty :—D. L. Kavanagh, A. A. Smart ; Feb. 10.

Stores Branch

Pilot Officer on probation A. Amy is confirmed in rank ; Jan. 25.

Accountant Branch

Flying Officer S. C. Gibbs relinquishes his short-service commn. on account of ill-health ; Feb. 10.

Memorandum

Flight-Lieut. M. C. H. Smith-Carington, T.D., relinquishes his hon. commn. on ceasing to be employed ; Jan. 9, 1925.

Reserve of Air Force Officers

G. N. Warwick is granted a commn. in Class A, General Duties Branch, as a Pilot Officer on probation ; Feb. 9. The following are confirmed in rank :—*Flying Officers.*—L. C. Burcher ; Dec. 17, 1925. D. H. Drew, A.F.C., D. W. Forshaw, C. S. Kent, A. R. Latham, W. Ledlie ; Feb. 4. *Pilot Officers.*—C. L. Atkinson, F. M. Brownlee, R. W. Cawston ; Feb. 4. The following Flying Officers are transferred from Class A to Class C (Feb. 9) :—F. J. E. Feeny, D.S.O., O.D. Freeman. Flying Officer F. E. C. Finzel is transferred from Class B to Class C ; Feb. 4.

ROYAL AIR FORCE INTELLIGENCE

Appointments.—**The following appointments in the Royal Air Force are notified :—**

General Duties Branch

Wing Commander : T. G. Hetherington, C.B.E., to Air Ministry, for duty as an "Attached Officer" ; 17.2.26.

Squadron Leaders : W. B. Farrington, D.S.O., to Air Ministry ; 1.3.26. G. H. Hall, A.F.C., to R.A.F. Depot ; 15.2.26. F. W. Trott, C.B.E., M.C. to Elec. and Wireless Sch., Flowerdown ; 2.2.26. W. B. Callaway, A.F.C., to H.M.S. *Eagle* ; 4.2.26. A. F. A. Hooper, O.B.E., to No. 5 Armoured Car Co., Iraq ; 18.12.25.

Flight Lieuts.: A. G. Bond, A.F.C., to Air Ministry ; 25.2.26. E. F. Turner, to No. 10 Group H.Q., Lee-on-Solent ; 15.2.26. G. W. Bentley, D.F.C., to R.A.F. Section, Admiralty Compass Observatory ; 8.2.26. L. G. Maxton, A.F.C., to No. 444 Flight ; 1.11.25. A. M. Wray, M.C., D.F.C., A.F.C., to Armament and Gunnery Sch., Eastchurch ; 15.2.26. H. A. Whistler, D.S.O., D.F.C., to H.Q., Iraq ; 29.1.26. T. H. Newton, D.S.C., to No. 481 Flight, Mediterranean ; 23.1.26. H. E. P. Wigglesworth, D.S.C., to No. 14 Sqdn., Palestine ; 14.1.26. E. J. McLoughlin, to No. 216 Sqdn., Egypt ; 17.1.26. C. L. King, M.C., D.F.C., to No. 70 Sqdn., Iraq, instead of to Station Commandant, Hinaidi, as previously notified ; 15.12.25. A. A. Ward, to No. 84 Sqdn., Iraq ; 17.1.26. F. G. Gibbons, D.F.C., to Heliopolis Details, Egypt ; 22.1.26. V. R. Scriven, A.F.C., to R.A.F. Base, Calshot ; 15.2.26. F. J. W. Mellersh, A.F.C., to No. 2 Flying Training Sch., Digby ; 1.3.26.

Flying Officers : R. H. W. Empson, to Armament and Gunnery Sch., Eastchurch ; 9.2.26. M. H. Garnons-Williams, to Armament and Gunnery Sch., Eastchurch ; 15.2.26. H. R. F. Baxter, to Armament and Gunnery Sch., Eastchurch ; 8.2.26. J. H. Hargroves, to No. 29 Sqdn., Duxford ; 15.3.26. R. F. Casey, D.F.C., to No. 99 Sqdn., Bircham Newton ; 15.2.26. E. C. Delamain, M.C., to R.A.F., Cadet College, Cranwell ; 16.2.26. N. H. D'Aeth, to No. 444 Flight ; 1.11.25. B. G. Pool, to No. 24 Sqdn., Kenley ; 2.2.26. S. J. Stocks, to Night Flying Flight, Biggin Hill ; 15.2.26. F. H. Bugge and A. W. Daly, to No. 2 Flying Training Sch., Digby ; 16.2.26. J. G. Western, M.B.E., to No. 31 Sqdn., India ; 15.1.26. (Hon. Flight Lieut.) C. M. E. Gifford, to No. 460 Flight, Mediterranean ; 22.1.26. F. F. Inglis, to No. 208 Sqdn., Egypt ; 18.1.26. O. K. Stirling Webb, to No. 45 Sqdn., Iraq ; 29.1.26. E. V. S. Lacey, to No. 14 Sqdn., Palestine ; 15.1.26. K. Maconochie, to No. 55 Sqdn., Iraq ; 29.1.26. C. R. Hancock, to Aircraft Depot, India ; 29.1.26. M. W. Goldie, to No. 84 Sqdn., Iraq ; 29.1.26.

Medical Branch

Squadron Leader : (Hon. W/Cdr.) E. Huntley, M.B., B.S., to R.A.F. Hospital, Cranwell ; 16.2.26.

Squadron-Leaders : A. Grant, M.B.E., M.B., D.P.H., to H.Q., India ; 15.1.26. K. Biggs, M.C., D.P.H., to R.A.F. Depot, on transfer to Home Estab. ; 29.12.25.

Flight Lieutenants : T. J. D. Atteridge to Central Flying Sch., Upavon, 2.2.26. C. V. D. Rose to Palestine General Hospital, 12.12.25. B. F. Haythornthwaite, M.B., B.A., to H.Q., Iraq., 3.1.26. C. A. Lindup to No. 5 Sqdn., India, 29.12.25.

Flight Lieuts.: V. S. Ewing, M.B., to Palestine General Hospital ; 14.1.26. P. A. Hall, M.B., B.A., to R.A.F. Hospital, Halton ; 23.2.26.

Flying Officers : W. D. McKeown M.B., to Elect. and Wireless Sch., Flowerdown ; 16.12.25. R. T. F. Grace, M.B., to R.A.F. Depot, on transfer to Home Estab. ; 14.1.26. G. M. Anderson, M.B., to No. 1 Flying Training Sch., Netheravon ; 3.1.26. J. Magner, M.B., to R.A.F. Base, Gosport, instead of to R.A.F. Depot, as previously notified ; 26.1.26.

Flying Officer : C. J. S. O'Malley, to R.A.F. Hospital, Halton ; 9.2.26.

Flying Officers : L. I. Hyder to Sch. of Tech. Training (Men), Manston, 28.1.26. E. J. Jenkins to Research Lab. and Med. Officers' Sch. of Instruction, Hampstead, on appointment to a Short Service Commission, 1.2.26.

Flying Officer (Dental), H. R. Peek to H.Q., Cranwell, on appointment to a Temp. Commission on attachment from Army, 1.2.26.

Chaplains' Branch.

Revd. J. H. P. Still, B.A., to H.Q., Palestine, 12.12.25.

NAVAL APPOINTMENTS

The following appointments have been made by the Admiralty :—

Lieuts. (Flying Officers, R.A.F.) : T. H. Villiers, attached to *Columbine* and for No. 406 Flight during Atlantic Fleet spring cruise ; Jan. 4. R. J. Berry, J. E. Vallance, and A. P. Colthurst, attached to R.A.F. Base, Gosport, during Atlantic Fleet spring cruise ; Jan. 21.

Royal Marines

Lieut. (Flying Officer, R.A.F.) : A. B. Woodhall, attached to R.A.F. Base, Gosport, during Atlantic Fleet spring cruise ; Jan. 21.

Royal Air Force

Flight Lieuts. : B. A. Malet, D.F.C., to *Eagle*, for signal duties ; Jan. 27. W. G. Preston, D.F.C., to No. 100 Sqdn ; Jan. 28. E. H. Bryant, to *Eagle*. addl., for No. 460 Fl'ght, in command. T. H. Newton, D.S.C., to No. 481 Flight ; Jan. 23.

Flying Officer (Hon. F.-L.) : C. M. E. Gifford, to No. 460 Flight ; Jan. 22.

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IN PARLIAMENT

R.A.F. Rejected Recruits

Mr. Hore-Belisha, on February 4, asked the Secretary of State for Air what percentage of new recruits for the Royal Air Force were discharged on account of some physical or medical disability in 1925 within 12 months of their acceptance ?

Sir S. Hoare : Less than 1 per cent. of recruits were discharged for the cause stated during 1925.

Civil Flying

Captain Benn, on February 10, asked the Secretary of State for Foreign Affairs whether any progress has been made in the negotiations as to the right of civil flying over German territory ?

Sir A. Chamberlain : The German Government have agreed to continue the present system up to March 31. What is to happen after that date is under consideration.

Captain Benn : Will negotiations as to the air clauses of the Treaty continue to be carried on by the Conference of Ambassadors, or will it pass under the competence of the League of Nations ?

Sir A. Chamberlain : I think that until they have been carried further than at present they cannot possibly pass to the League of Nations.

French and Italian Air Forces

Mr. Gillett asked the Secretary of State for Foreign Affairs what are the figures for the last three years of the number of men and machines in the French and Italian Air Forces ?

Major Sir Philip Sassoon : I have been asked to reply. So far as I am aware the French and Italian Governments have not recently published exact statistics as to the strength of their respective Air Forces, but according to my information the first line strength of the French Air Services at the present time is approximately 1,300 machines, whilst the corresponding figure for the Italian Air Force is 600 machines. There has been little change in these figures during the past three years, but the French figure represents a small increase as compared with 1924, whilst the Italian Air Force is in the early stages of a considerable programme of expansion. As regards personnel it is not practicable to give figures since a large number of those employed on air duties are found from the Navy and Army, both in France and in Italy.

Captain Wedgwood Benn : Is the expansion of the French Air Force in accordance with the anticipations of the Government of last year when our own Air Force was expanded ?

Sir P. Sassoon : The increase since 1924 is only a small increase, and I think it is entirely in accord with what we anticipated.

Light Aeroplane Sporting Clubs' Grant

Mr. Viant asked the Prime Minister whether, in view of the fact that in the interests of economy the grant of £15,000 to the cadet corps of the Territorial Army has been, or is to be, withdrawn, it is proposed to continue the grant of £15,000 to light aeroplane sporting clubs ?

The Prime Minister : As recently announced by the Secretary of State for War, the grant to the cadet corps of the Territorial Army has not been withdrawn, but will be paid during the current year. The grant to light aeroplane sporting clubs, which stands on quite a different footing, will continue to be paid.

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Aircraft Carriers.

H.M.S. "Eagle," Captain W. M. Kerr, C.B.E., has completed her refit at Portsmouth, and has received orders to leave for Gibraltar and Malta. The other aircraft-carrier of the Mediterranean Fleet, H.M.S. *Hermes*, Captain C. P. Talbot, D.S.O., has concluded her special service in China, for which she was lent at the time of the disturbances last July.

AIR POST STAMPS

By DOUGLAS B. ARMSTRONG

Polish Air Stamps

THE first air post stamps to be issued under government authority in Poland made their debut about the middle of September in nine denominations, lithographed on semi-transparent paper with a vignette of a mail 'plane in the clouds above Warsaw. Beneath the picture appears the word "LOTNICZA" (signifying "Air Post"). The set is comprised as follows :—1 groszy pale blue, 2 gr. orange, 3 gr. chestnut, 5 gr. brown, 10 gr. blue-green, 15 gr. magenta, 20 gr. sage-green, 30 gr. carmine, 45 gr. purple.

Previous issues of Polish air stamps have been only quasi-official in character and incapable of prepayment, except in conjunction with ordinary postage stamps. The two outsize vignettes, which were used for the temporary air-post service in connection with the Posen Fair of 1921 were supplied by the proprietors of a local distillery on condition that the initials of the concern T.A.B.R.O.M.I.K. were printed as an advertisement upon the margins of the stamps.

One of the designs consists of a winged man symbolizing Flight, posed against a background representing the city of Posen, with aeroplanes circling overhead. This was employed for the 25 marks vignette, while a passenger 'plane flying over open country and leaving a trail of letters in its wake figures upon the companion 100 marks. Both were the work of a local artist, W. Rudy, whose initials may be found in the corners of the stamps. Fifty-thousand copies of either value were printed by the Lithographischen Kunstantaet Pilezek, of Posen, of which only a small proportion was actually used upon letters transmitted by air to Warsaw, Lodz, Cracow, Kalisch, Lemburg and Danzig, under the auspices of the Polska Komunikacja Powietrzna between May 29 and June 8, 1921. The remainder of the unused stamps was subsequently sold to a stamp dealer, *en bloc*.

Some propaganda stamps prepared on behalf of the Polish League of Aerial Defence, bearing the device of a winged propeller, surmounted by the initials L.O.P.P. (Liga Obrony Powietrznej Panstwa) were on sale at Polish aerodromes during the week October 5 to 12, 1924, but their use upon air-post letters was entirely optional. They exist in denominations 10 gr. blue or green, and 50 gr. rose. Aerial League stamps of more elaborate design depicting an aeroplane flying over the city were issued at Warsaw early in the present year (1925), values 5 gr. orange and 10 gr. blue, but these did not represent air-post fees either.

Bolivian Air Mails

FOUR years have elapsed since the formation of La Sociedad Boliviana de Transportes Aeros holding a government concession to operate an air post line between Cochabamba and Santa Cruz. The route in question has still to be opened up to air traffic, but meanwhile tentative air-post flights were carried out in September and October last from Cochabamba to Sucre and La Paz by means of a Junker plane presented to the Republic by some wealthy German-Bolivians.

In this connection the current 50 centavos postage stamp was overprinted "Correo Aereo," followed by the names of the terminal towns and dates of the flights, at first in green and later in red. About 800 letters are believed to have been conveyed on one of these mail flights.

New Trans-European Air Lines

QUITE an interesting collection might be made of covers carried on the first flights over various branches of the trans-European air post system. New lines have recently been opened up from Vienna to Constantinople *via* Bucharest (September 25), and Vienna-Nuremburg-Leipzig-Berlin (September 7).

Latest Swiss Air Mails

AN extraordinary air post flight occurred on October 3, between Geneva and Milan, when letters both ordinary and registered were impressed with a rectangular cachet in violet, inscribed "1er Poste Aerienne Geneve-Milan, 3 Oct. 1925."

With the sanction of the Swiss Ministry of Posts letters and cards were carried by aeroplane from Dubendorf (Zurich) to St. Gallen upon the occasion of a military aviation meeting held at the former place on October 18, 1925. Souvenir cards of 10 c. and 20 c. were provided by the organising committee and cancelled with a special postmark containing the words "Militarflugkonkurrenz 18. X. 1925-Flugpost Zurich-St. Gallen," struck in violet.

IMPORTS AND EXPORTS, 1925-1926

AEROPLANES, airships, balloons and parts thereof (not shown separately before 1910). For 1910 and 1911 figures see "FLIGHT" for January 25, 1912 ; for 1912 and 1913. see "FLIGHT" for January 17, 1914 ; for 1914, see "FLIGHT" for January 15, 1915 ; for 1915, see "FLIGHT" for January 13, 1916 ; for 1916, see "FLIGHT" for January 11, 1917 ; for 1917, see "FLIGHT" for January 24, 1918 ; for 1918, see "FLIGHT" for January 16, 1919 ; for 1919, see "FLIGHT" for January 22, 1920 ; for 1920, see "FLIGHT" for January 13, 1921 ; for 1921, see "FLIGHT" for January 19, 1922 ; for 1922 see "FLIGHT" for January 18, 1923 ; for 1923, see "FLIGHT" for January 17, 1924 ; for 1924, see "FLIGHT" for January 22, 1925 ; for 1925, see "FLIGHT" for January 21, 1926.

	Imports.		Exports.		Re-Exports.	
	1925.	1926.	1925.	1926.	1925.	1926.
	£	£	£	£	£	£
Jan. ..	3,546	494	83,728	130,049	291	—

* * *

NEW COMPANIES REGISTERED

COMMERCIAL AIRSHIPS, LTD., Broadway House, 1A, Adelaide Road, Hampstead, N.W. 3.—Capital £16,000, in 12,000 prefer. shares of £1 and 80,000 ordinary shares of 1*s*. Objects : To carry on business as an aerial transport company for the conveyance of goods and passengers, and for advertising purposes and other services ; to manufacture and deal in balloons, aeroplanes, airships, etc. ; to provide and erect aerodromes, etc. Provisional directors : M. A. Klanck, H. W. Windle. Secretary : M. A. Klanck.

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* * *

PUBLICATIONS RECEIVED

Jupiter Series IV Aero Engine. Air Publication 1162 (1*st Edition, May*, 1925.) H.M. Stationery Office, Kingsway, London, W.C. 2. Price 3*s*. 6*d*. net.

Bulletin de la Federation Aeronautique Internationale. 6*th Year. Nos.* 23-24. *September-December*, 1925. Federation Aeronautique Internationale, 35, rue Francois 1er, Paris.

* * *

AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations : Cyl. = cylinder ; i.c. = internal combustion : m. = motor.
The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

APPLIED FOR IN 1924.

Published February 18, 1926

19,609. C. E. JONES. Distant control devices, such as engine stop-motions, etc. (246,188.)
24,956. R. F. POWER. Apparatus for demonstrating variable courses of aircraft, etc. (246,207.)
26,079. C. R. FAIREY, and M. LOBELLE. Radiators. (246,231.)

APPLIED FOR IN 1925.

Published February 11, 1926

1,744. P. C. RUSHEN (BROCK AND WEYMOUTH, INC.) Cameras for aerial photography. (245,942.)
2,090. M. BLANQUIER and L. VINAY. Parachutes. (228,180.)
21,367. N. P. LITHANDER. Rotary engines. (239,507.)
27,861. SOC. RATEAU. Blades of rotary fans. (242,977.)

Published February 18, 1926

10,394. A. S. Heinrich. Radiators. (233,332.)
18,300. A. LAMBLIN. Radiators. (237,274.)
19,650. E. J. BECHARD. Contact device for preventing aircraft from bursting into flames as result of a crash. (237,930.)

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Tottenham 37 (2 lines); 2488 (4 lines); "Britoxygen" Tottlane, London.

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Beardmore, Wm., & Co., Ltd., Dalmuir.
Blackburn Aeroplane and Motor Co., Ltd., Olympia, Leeds. Roundhay 601 (5 lines).
Boulton & Paul, Ltd., Norwich.
Norwich 851; "Boulton," Norwich.
Bristol Aeroplane Co., Ltd., Filton House, Filton, Bristol. Bristol 3906; "Aviation," Bristol.
De Havilland Aircraft Co., Ltd., Stag Lane Aerodrome, Edgware. Kingsbury 160.
Fairey Aviation Co., Hayes, Middlesex.
Hayes 136-7-8.
The Gloucestershire Aircraft Co., Ltd., Sunningend Works, Cheltenham.
Brockworth Aerodrome, Glos.
Cheltenham 1161-2-3-4; "Glosaircra, Cheltenham."
Handley-Page, Ltd., Cricklewood.
Hampstead 7500.
H. G. Hawker Engineering Co., Ltd., Kingston-on-Thames. Kingston 1988.
N. V. Nederlandsche Vliegtuigenfabriek.
Rokin 84, Amsterdam.
Pander & Zonen, Zuid Binnensingel, Den Haag.
34160; "Pander."
Parnall, George, & Co., Coliseum Works, Park Row, Bristol.
4775 (2 lines); "Warplanes," Bristol.
Roe, A. V., Ltd., Manchester. City 8530, 8531, Manchester: "Triplane," Manchester.
Hamble, near Southampton:
Hamble 18: "Roe," Hamble.
Short Bros. (Rochester and Bedford), Ltd., Seaplane Works, Rochester, Kent.
Chatham 627; "Seaplanes," Rochester.
Supermarine Aviation Works, Ltd., The, Southampton.
Woolston 37; "Supermarin," Southampton.
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"Vickers," Sowest, London.
Westland Aircraft Works, Yeovil.
Yeovil 141 (4 lines); "Aircraft, Yeovil."

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"Cryolite," Bilgate, London.

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Cellon (Richmond) Ltd., Cellon Works, Petersham Road, Richmond. Richmond 2213 (2 lines); "Ajawb," Richmond, Surrey.
Neocellon, Ltd., Garratt Lane, London, S.W. 18.
Battersea 218; "Neocellon," Wands.
Titanine-Emaillite, Ltd., Empire House, 175, Piccadilly, London, W. 1. Gerrard 2312,
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Mayfair 6040 (4 lines); "Rolhead," Piccy, London.

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NO. OF HOURS RUNNING COMPLETED :—134 Hours.

NO. OF MILES FLOWN :—14,850.

ENGINE REPLACEMENTS TO DATE :—NONE.

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OFFICIAL ORGAN OF THE ROYAL AERO CLUB OF THE UNITED KINGDOM.

No. 896. (No. 8. Vol. XVIII.) Registered at the General Post Office as a Newspaper. FEBRUARY 25, 1926. Sixpence Weekly.

NIAN INSTITUTION
JAN 11
NATIONAL AIR MUSEUM

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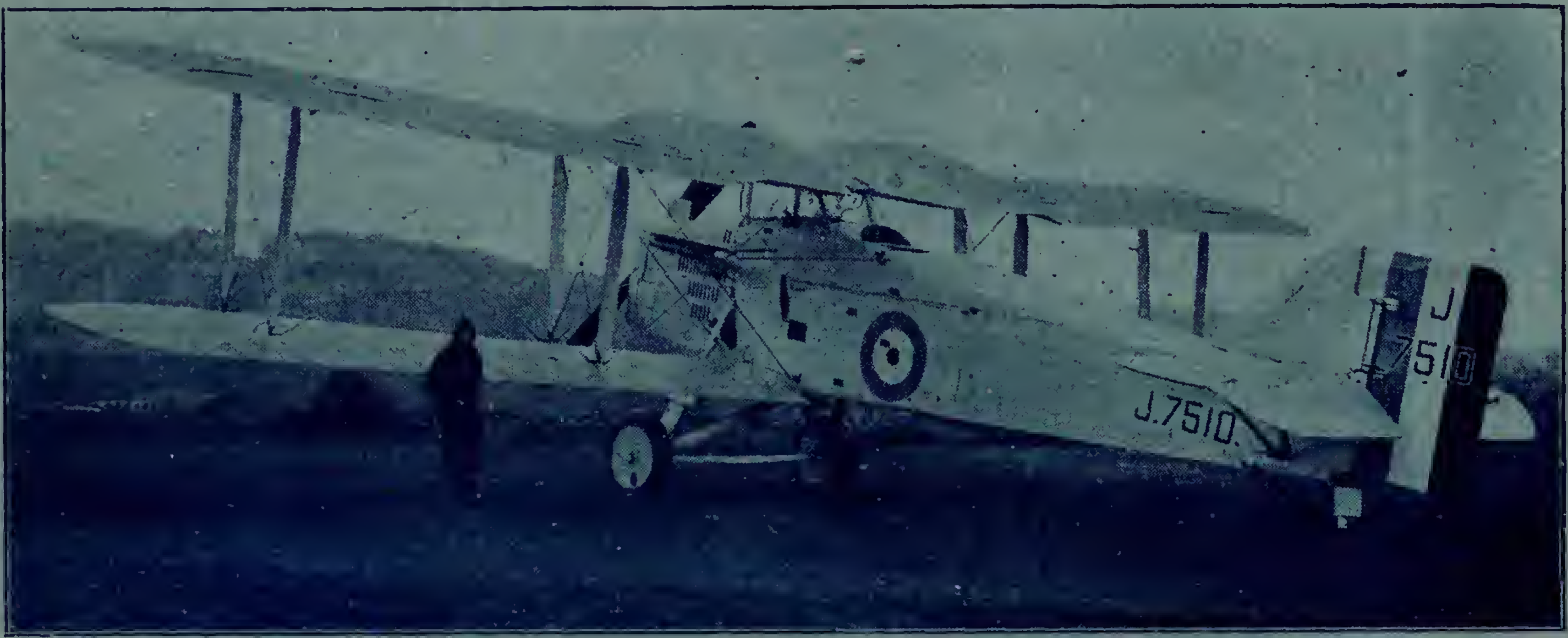
WESTLAND



The photograph is of the Yeovil Day Bomber, one of the latest machines built at the Westland Aircraft Works. It marks an important stage in the development of this type of aircraft, possessing among its other features of superiority—a good view for pilot and observer in all directions, stability (for accurate bombing), gravity feed of petrol from tanks in upper plane, and oleo-rubber undercarriage with wide track. It has a Rolls-Royce Condor engine of 670 h.p. with Leitner-Watts metal propeller. The performance of the machine which was built for the Air Ministry, is highly satisfactory.

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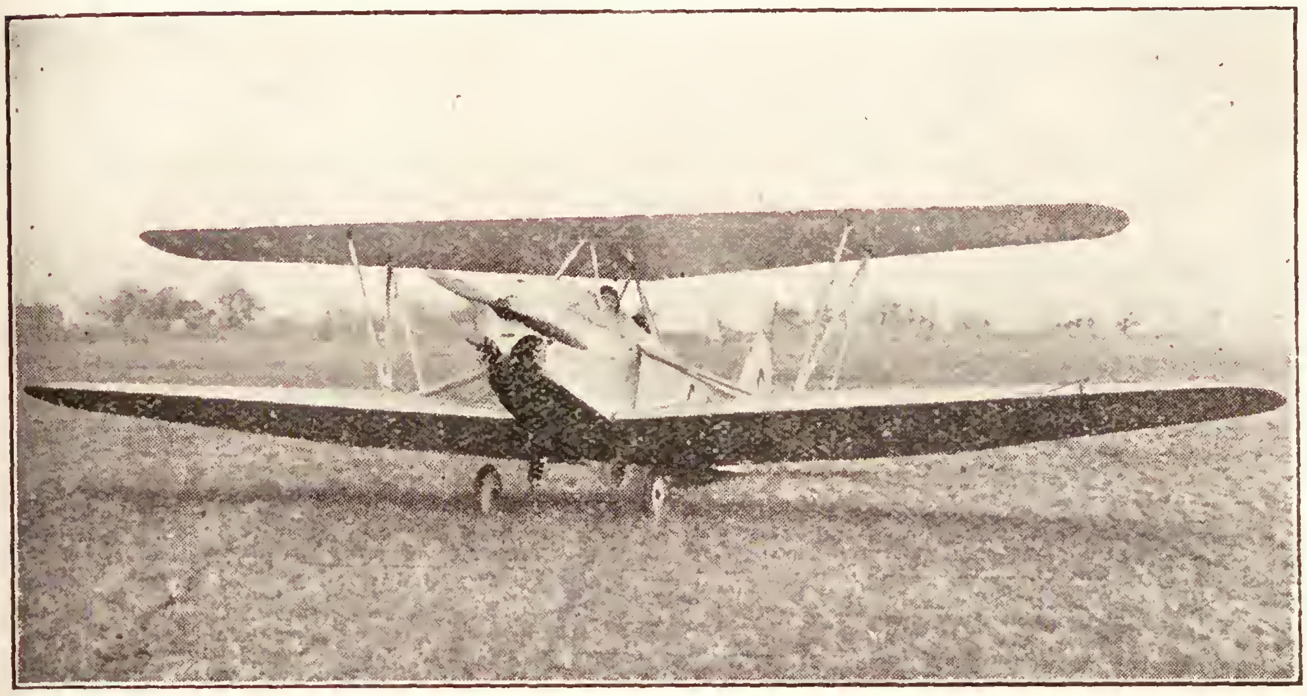

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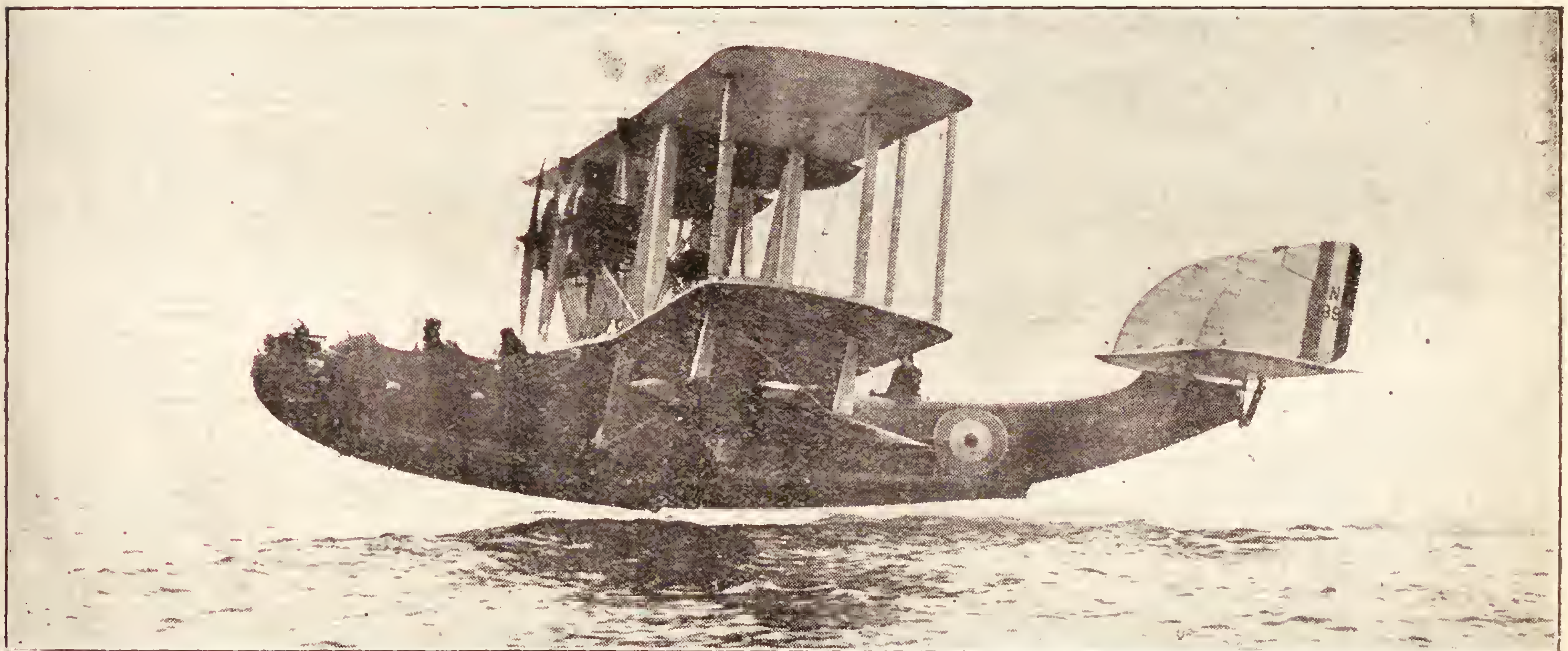

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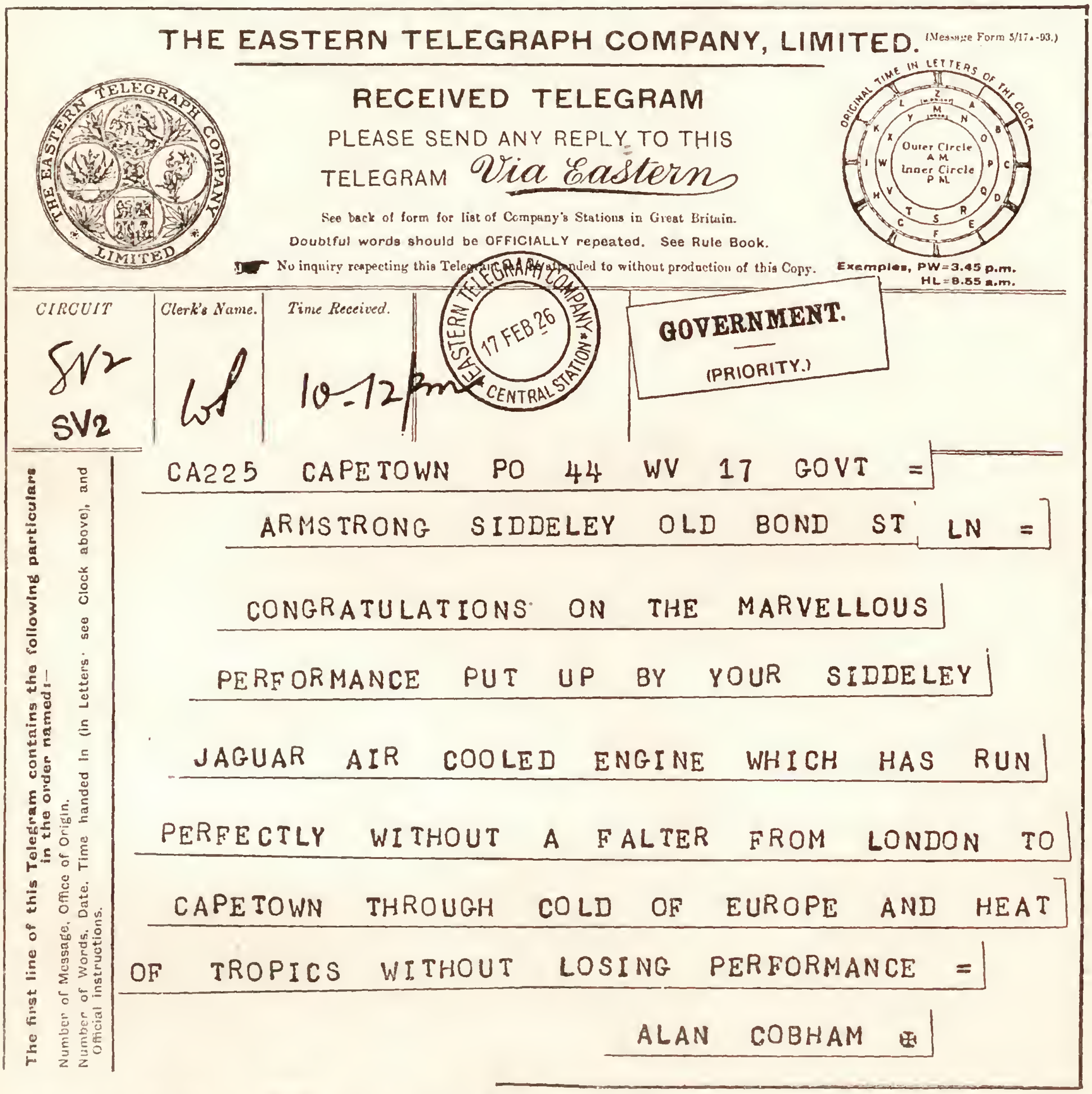
AS AN EXAMPLE OF WIDE RANGE OF DESIGN, CONTRAST THE ABOVE TWIN ENGINED MACHINE WITH THE **SUPERMARINE NAPIER S4** MONOPLANE DESIGNED AND CONSTRUCTED FOR THE SCHNEIDER CUP RACE, 1925.

SUPERMARINE

Alan Cobham's Cable.



THE EASTERN TELEGRAPH COMPANY, LIMITED. (Message Form 5/17A-93.)

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Flight

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CONTENTS

Editorial Comment PAGE

The Air Estimates 101
The "K. 1." Monoplane 103
Royal Aero Club Official Notices 105
"Private Flying" 105
London-Cape Town Survey Flight 108
Sir Samuel Hoare at Cambridge 109
Light 'Plane Club Doings 110
THE AIRCRAFT ENGINEER 110*a*
Beardmore W.B. XXVI 111
The World's Airways 111
Air Estimates 112
Air Ministry Notices ... ... 1'6
Royal Air Force 117
R.A.F. Intelligence 117
In Parliament 117
Correspondence 118

DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list :—

1926		
Feb. 25	....	Flight-Lieut. H. Cooch. "Landing Aeroplanes in Fog," before R.Ae.S.
Mar. 4	....	Maj. G. H. Scott. "Development of Airship Mooring," before R.Ae.S.
Mar. 9	....	Mr. O. E. Simmonds, M.A., A.F.R.Ae.S., M.I.Ae.E. "The Development of Civil Marine Aircraft," before Inst.Ae.E.
Mar. 18	....	Mr. A. J. Cobham. "Long-Distance Aeroplane Flights," before R.Ae.S.
Mar. 22	....	Entries close for Gordon Bennett Race.
Mar. 31	....	Entries close for Schneider Cup Race.
April 13	....	Mr. S. H. Evans, A.F.R.Ae.S., M.I.Ae.E. "The Performance of Modern Aircraft —with special reference to the Variable Wing," before Inst.Ae.E.
April 15	....	Capt. G. T. R. Hill. "The Tailless Aeroplane," before R.Ae.S.
April 21	....	Inst.Ae.E. visit to Messrs. D. Napier and Son, Acton.

EDITORIAL COMMENT.

The Air Estimates

THE Air Estimates, which in many circles of the community have caused considerable misgivings during the last two months or so, were published towards the end of last week, and the fears that had been entertained appear to have been only too well founded. For once rumour has been reasonably accurate, and the brunt of the reductions seems to have fallen on just the particular vote which should, in our opinion and that of a very large number of independent observers qualified to judge, be the last vote to be interfered with, *i.e.*, Vote 3 (Technical and Warlike Stores), and more particularly sub-head A of Vote 3 (Aeroplanes, Seaplanes, Engines and Spares). As we have repeatedly pointed out in these columns, the British aircraft industry is the foundation for our whole air defence, and to undermine that foundation is to produce a tottering structure which cannot possibly be safe, and which could certainly never "pass the A.I.D." Yet that is precisely, unless we have failed to interpret the somewhat involved estimates, what it is proposed to do. Works, buildings, lands, staffs, mechanical transport, messengers, clerks and similar "effective and non-effective" (especially the latter) services must go on whatever happens. But if the question of effecting economies arises, then let the aircraft industry be the section to suffer. The nation must buy palaces for the staffs which direct the destinies of our air defences, but the fact that if we go on in the way we have been doing there may be no air defences to direct seems to have been overlooked.

To come down to figures, Vote 3, sub-head A1, calls for the sum of £2,888,000 to be expended upon complete machines. The corresponding figure last year was £2,908,000. Apparently, therefore, the "cut" only amounts to £20,000. But it should be remembered that the aircraft industry had been led to believe that there could be no question, not only of reduction, but that a steady increase in orders might be counted upon. Under that understanding, and it was an impression which had a very good foundation since even the Labour Government had approved of this principle, the aircraft industry prepared its plans, laid down plants for which, in less secure circumstances, there would in many cases have been no justification, carried out individual researches and experiments which many of the firms who undertook them could ill afford, carried on with but small profits, or even at a loss, always under the impression that a definite programme of steady expansion would be adhered to whatever Government happened to be in power. Now it is found that the Government from which one least expected such action has not only failed to adhere to its policy of steady increase in orders, but is actually calling for a reduction in orders. The actual "cut," as we have said, is insignificant, but the failure of the anticipated increase to materialise is vastly more serious.

Vote 3, sub-head A2, is even more unsatisfactory. This relates to complete aero engines. The figure to be voted is £1,031,000, as compared with £1,537,000 last year. *Thus, under this head alone it is proposed to "save" no less than* £506,000. At the moment there are, to all intents and purposes, but four British firms producing aero engines of types that come into consideration in the Air Estimates. The "cut," therefore, means that, if orders were evenly distributed (which, in point of fact, they are not) each firm would be "down" on orders to the extent of £126,500. Put in another way: if it is assumed that the average price of an aero engine is £2,000, the reduction means that 253 fewer engines will be purchased. Probably the actual number would be nearer 300. The same remarks about the expectation of increased orders apply to the engine firms as to the aircraft firms, so that actually the position of the four British Aero engine firms will be worse than the figures themselves indicate, which are already bad enough in all conscience.

Sub-head A3 of Vote 3, dealing with machine spares, parachutes and miscellaneous, is estimated to require £913,000, as against £859,000 the previous year. This might give the impression that the aircraft constructors will receive rather larger orders for machine spares. Even if this were so, it is unsatisfactory, since our main designing firms ought to be fully occupied producing new and improved types of machines, and not in turning out spares. Actually even this figure, which indicates an increase of £54,000, does not necessarily mean extra work for the aircraft firms. It will be noted that the sub-head includes parachutes, and it will be remembered that large numbers of these are being obtained from America, so that one is justified in assuming that a not inconsiderable proportion of the sum to be voted under this sub-head will go to foreign manufacturers.

Under sub-head A4 (engine spares) there is a reduction of £41,000, from £560,000 to £519,000, which "cut" will also have to be sustained by the aero engine firms. These will, therefore, so far from enjoying the expected increase in orders, actually sustain a loss of orders to the tune of £547,000. As we have repeatedly pointed out, it costs a great deal more to develop a new type of aero engine than it does to produce a new type of aircraft; also it takes very much longer. Now an aero engine firm is not paid for its experimental and development work, and must hope to make up the money spent in this way on orders for the completed engine. That is why the reductions to be found under sub-heads A2 and A4 must necessarily hit the aero engine firms very hard indeed, and that at a time when it is generally admitted that a great effort should be made to evolve new types of aero engines for modern conditions. Other countries are going ahead. The United States have spent a great deal of money on the production of new types of aero engines. France has just completed a long aero engine competition in which prizes to the amount of one million francs were offered. Yet we propose to cut down, not by a relatively small amount but by more than half a million sterling, the orders to our four engine firms. The outlook is, in this respect, truly serious.

We make no apology for devoting so much space to Vote 3A. It is the one vote in which we are particularly interested, and it deals with the fundamental basis of the whole British air defence. The whole of Vote 3 shows an *increase* of £441,000 in spite of the money "saved" on the really essential sub-heads of the Vote, so that the nation is merely taking away a lot of money badly needed to keep the aircraft industry alive and spending it in other directions, which are not, cannot be, anything like as fundamentally important.

Space does not allow of referring in detail to the other Votes, but by way of showing how the money is being spent it is of interest to take the gross total of the Air Estimates, £20,864,500, and see what approximate percentage of this total is being devoted to the various votes. The pay of the R.A.F. is £4,667,000, or 22 per cent.; quartering, stores, supplies and transport call for £2,268,000, or 10·8 per cent.; technical and warlike stores (including Experimental and Research Services), £8,231,000 (39·5 per cent.); works, buildings and land, £2,843,000 (13·6 per cent.); medical services, £347,500 (1·66 per cent.); educational services, £448,000 (2·15 per cent.); auxiliary and reserve forces, £406,500 (1·95 per cent.); civil aviation, £473,000 (2·27 per cent.); meteorological and miscellaneous effective services, £172,000 (0·83 per cent.); Air Ministry, £762,000 (3·65 per cent.); and non-effective services, £246,500 (1·17 per cent.).

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At St. James's Palace

At the Levee held by His Majesty the King on February 23rd at St. James's Palace, the following were amongst those present:—

Air Marshal Sir John Salmond, Principal Air Aide-de-Camp, Air Chief Marshal Sir Hugh M. Trenchard, Bart., Wing Commander J. H. S. Tyssen, Flight Lieut. G. W. Hemming, Sir Samuel Instone, Senor Col. Don Fernando Rich (Spanish Air Attaché), Lieut. de V. Bos (French Air Attaché), Major H. C. Davidson (U.S. Air Attaché), Capt. T. Toyoda (Japanese Air Attaché), Commander A. de Bahr (Swedish Air Attaché), and others. The following were presented to His Majesty the King: General A. Guidoni (Italian Air Attaché), Major Don Diego Aracena (Chilean Air Attaché—Military), Air Vice-Marshal T. I. Webb-Bowen, C.B., C.M.G., Flying Officer H. G. Brookman, Flying Officer W. N. Lancaster, Flying Officer C. G. H. Lumsden, Flight Lieut. A. McR. Moffatt, Flight Lieut. E. R. Openshaw, Mr. W. S. Smith, C.B., O.B.E., Flying Officer P. Stainer, Flight Lieut. V. H. Tait, Flight Lieut. W. W. Wakefield, etc.

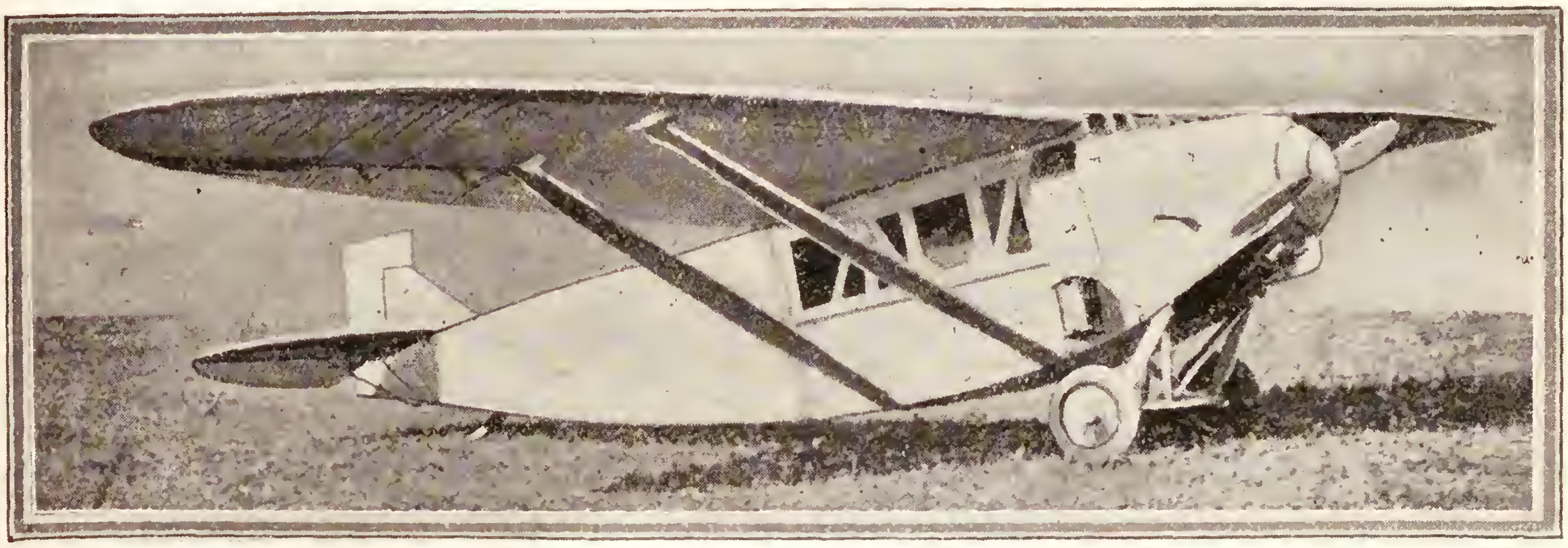
Aircraft Search for Missing Seamen

Irish Free State aeroplanes have been employed in searching amongst the lonely islands off the coast of Galway for the missing crew of the trawler "Cardigan Castle," but without success.

THE "K.1" MONOPLANE

A Commercial Machine Constructed in Soviet Russia

We have of late been able to give readers of *Flight* certain information regarding aviation in Soviet Russia, from which it will have been apparent that this country is fully aware of the importance of aviation—both commercial and military. Indeed, Soviet Russia is making a bold bid for a foremost position in the world of aeronautics.


THE "K.1" COMMERCIAL MONOPLANE: Three-quarter front view of a passenger aeroplane built in Soviet Russia. It is fitted with a 170 h.p. Salmson engine.

So far, Russia has done but little as regards the design and construction—although mention should be made of the successful Russian designer, Sikorsky, who constructed, some time ago, the forerunners of the Giant multi-engined aeroplane, and who is now producing aircraft in America.

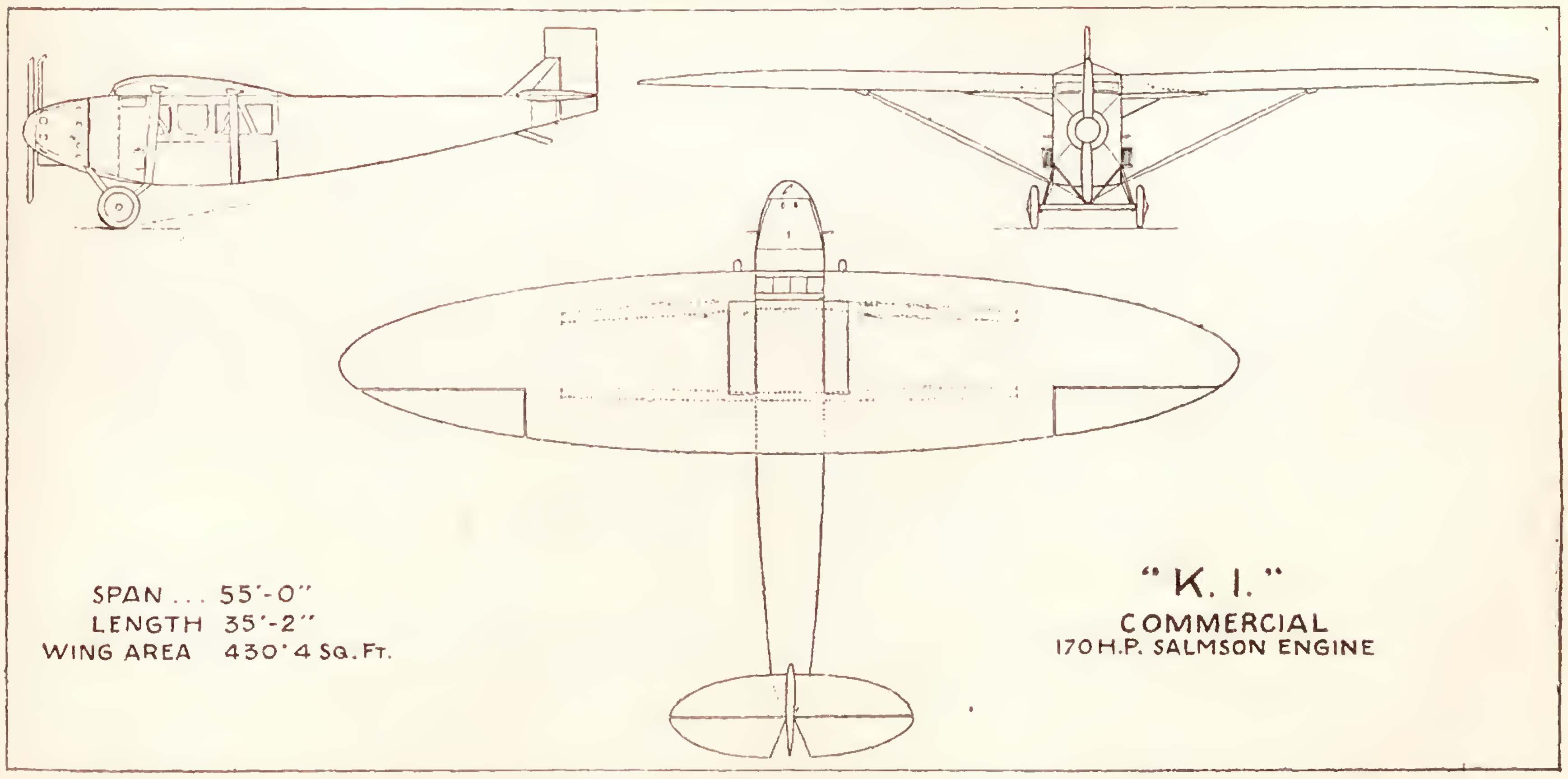
Recently, however, we learn that Soviet Russia has been giving more attention to the construction side of aeronautics, and that factories have been established where aircraft are being—or have been—constructed. We are able this week, through the courtesy of the Soviet Aircraft journal "Samolet," to give a brief description of one of these Russian-built aeroplanes—the "K.1."

The "K.1" is a tractor high-wing monoplane of the enclosed cabin or limousine type, similar to the Dornier "Komet" monoplanes, which are employed on certain of the Russian air lines. It was originally constructed in one of the Soviet factories in 1920, under the very difficult conditions obtaining at that time. It was not until five years later, however, that the completed machine made its appearance as a commercial aeroplane under the title of R.W.Z.6.—K.1. K. A. Kalinin, who was a pilot himself in 1916, and who is now at the head of the Bureau of Construction, was responsible for the design of this machine.

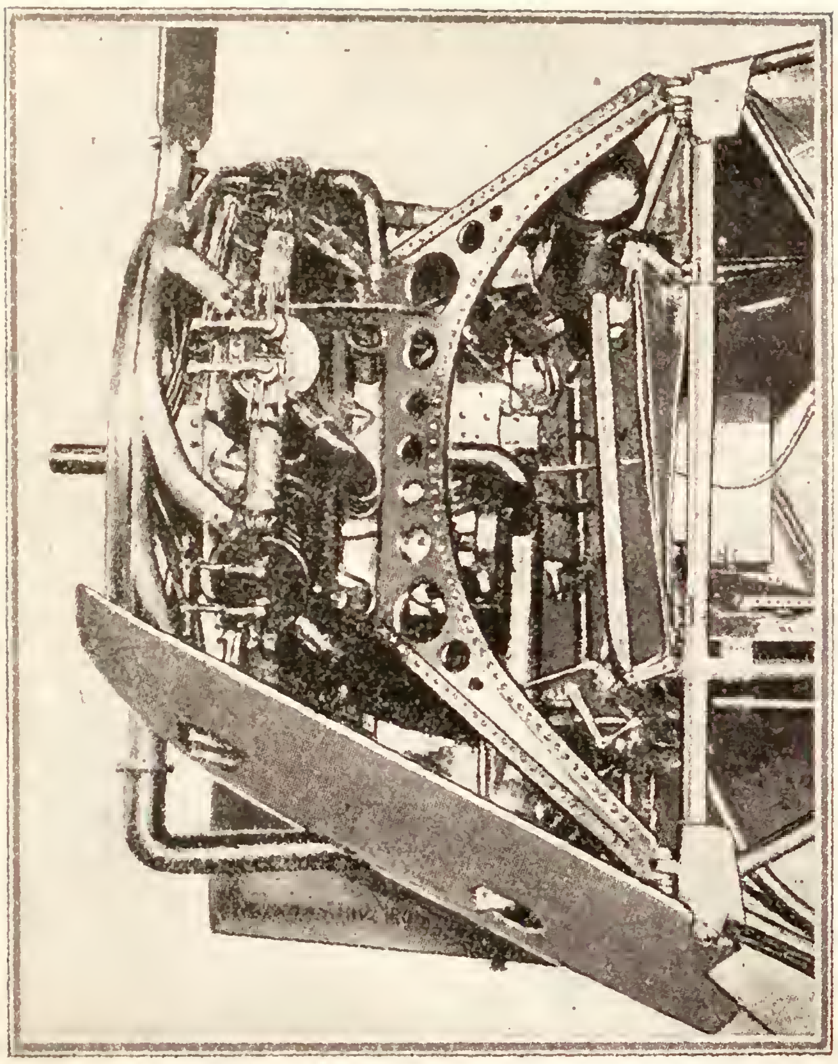
An interesting point regarding the construction of the K.1 is the use of steel tubes, which had been in stock in connection with the Voisin machines previously used in Russia, but since abandoned. These tubes were, of course, first tested in the laboratories and were found to be satisfactory for the purpose, and have been employed throughout in the construction of the fuselage, under-carriage and rudder. The wings and tail surfaces, however, are of wood construction. "Samolet" refers to the fact that M. Kalinin was helped considerably in the production of this machine by the workmen, who showed great interest and enthusiasm in its design.

As will be seen from the accompanying illustrations, the fuselage of the "K.1" is of deep rectangular cross-section, with enclosed cabin, provided with a door and windows, for the passengers, located immediately beneath the wings, and with an enclosed cockpit for the pilot located high up in the fuselage at the leading edge of the wings.

Communication is provided between the pilot's and passengers' compartments by means of a door. The covering



THE "K.1" COMMERCIAL MONOPLANE: General arrangement Drawings.



The detachable engine mounting on the Russian "K.1" monoplane.

of the fuselage from the engine to the rear of the cabin is sheet aluminium, while the remaining portion of the fuselage is fabric-covered.

The engine, complete with accessories, is mounted on a special frame, which is attached to the fuselage by four bolts, and it is possible to remove this frame and replace it by another frame with a spare engine installed in about half-an-hour. Or, if desired, an engine of different make can be fitted. For instance, at present a 170 h.p. Salmson engine is fitted, but provision has been made in the design for replacing this engine by one of entirely different make, such as the 185 h.p. B.M.W., for which engine a special engine frame is employed, but which is attached to the fuselage by the same four bolts.

The wings of the "K.1" form another feature, for M. Kalinin has adopted the elliptical plan form, which, although presenting certain difficulties from the production point of view, possesses good aerodynamical qualities. The wing section employed is the Prandtl No. 436.

The wings, which are set at a dihedral angle of 6°, are built up in three sections, a centre panel mounted on the top of the fuselage, and two outer panels bolted to the former. Bracing is by two pairs of steel struts streamlined by aluminium fairings extending from the lower longerons of the fuselage up to the wings. The strut attachments to the latter are faired by neat aluminium boxes.

An elliptical plan form is also employed for the horizontal tail plane and divided elevator, but the section is symmetrical. A small triangular vertical fin, to which is hinged a balanced rudder, is mounted above the horizontal tail plane. The angle of incidence of the tail plane, it should be noted, can be adjusted to meet variations of load. Wings and tail surfaces are fabric covered. Lateral balance is obtained by means of ailerons, which, it will be observed, are not particularly large.

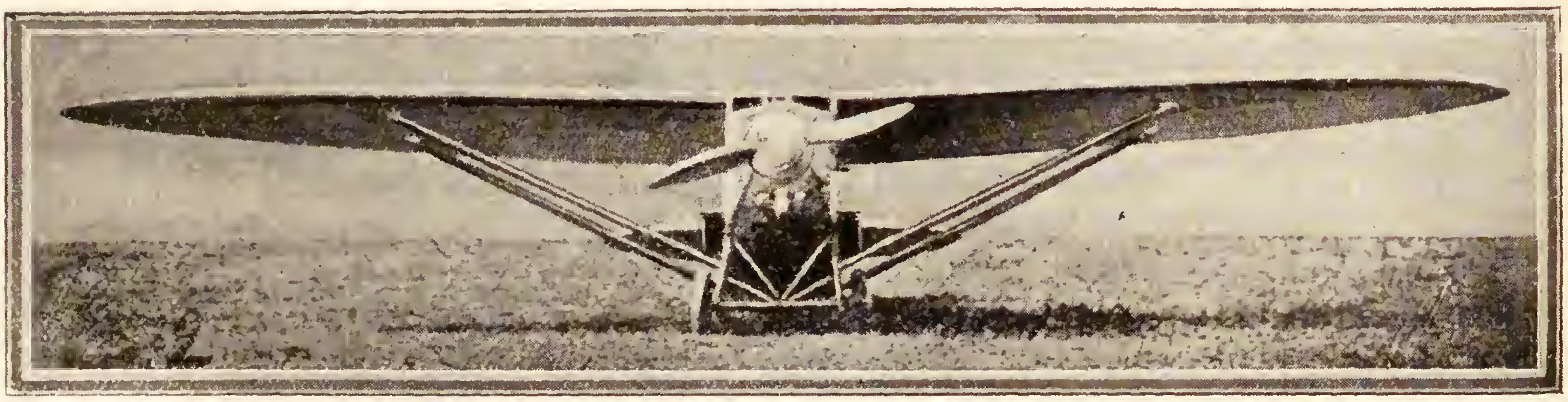
A conventional V-type undercarriage, with V-inter-strut bracing, is employed, the struts being steel tubes with streamline aluminium fairings. A special airscrew, designed by M. Kalinin and constructed in the R.W.Z.6 factory, is fitted.

If required, the "K.1" can be adapted for hospital work, the cabin being altered to accommodate three berths, stretchers and other hospital appliances. Its adaptability is thus particularly suitable for the conditions in Russia.

The "K.1"—which is the first machine employing steel tube construction to be produced in Russia—was completed in July, 1925, and on the 26th of that month made its first trial flight, piloted by the work's chief pilot, Kossinsky, with satisfactory results. In September the first flight with passengers was made to Moskva, via Charkov. The 430 kms. (266·6 miles) to Charkov was accomplished in 2 hrs. 45 mins. at an average speed of 156 k.p.h. (96·7 m.p.h.), and the 390 kms. (242 miles) to Orel in 2 hrs. 55 mins. The remaining 380 kms. (235·6 miles) to Moskva, against a strong headwind, took, also, 2 hrs. 55 mins. This was in the nature of its official trial, and after further various trials under a special commission, it was found to answer all requirements, and was therefore passed on for service on the civilian air lines.

The principal characteristics of the "K.1" are :—

Span	16·76 m. (55 ft. 0 ins.).
Chord	3·50 m. (11 ft. 5 ins.).
O.A. length	10·72 m. (35 ft. 2 ins.).
Wing area	40 sq. m. (430·4 sq. ft.).
Weight laden (approx.)	2,000 kgs. (4,400 lbs.).
Wing loading ..	49·3 kgs./m^2 (10·1 lbs./sq. ft.).
Power loading ..	12·3 kgs./h.p. (27 lbs./h.p.).
Speed range	60-160 k.p.h. (37-99 m.p.h.).
Climb in 12 mins. ..	1,000 m. (3,280 ft.).
Ceiling	3,000 m. (9,840 ft.).
Gliding angle	1 in 9·2.
Pull-up in landing ..	100-120 m. (328-373 ft.).



THE "K.1" COMMERCIAL MONOPLANE : Front view of the Russian-built machine, the first to be produced in that country employing tubular steel construction.

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A Canadian Air Service

THE Ontario Government has arranged for the establishment, through private contractors, of an aeroplane service from Hudson station, on the Trans-Continental Railway, to the new Red Lake (Ontario) gold area.

Another Brussels-Congo Flight ?

THE Belgian pilot, Lieut. Medaets, is shortly to undertake a second flight from Brussels to Kinshasa, in Belgian Congo, and back. The Belgian Cabinet has agreed to provide 100,000 fr. towards the expenses of the expedition. This time a different route will be followed, for, instead of flying *via* Morocco and across the Sheard, the Nile Valley route will be taken as far as Kenya, thence westward through Belgian Congo, a total distance of nearly 6,000 miles. Incidentally, it may be mentioned that the remaining portion of the Kinshasa—Elizabethville air line (operated with Handley Page machines) was opened on February 12.

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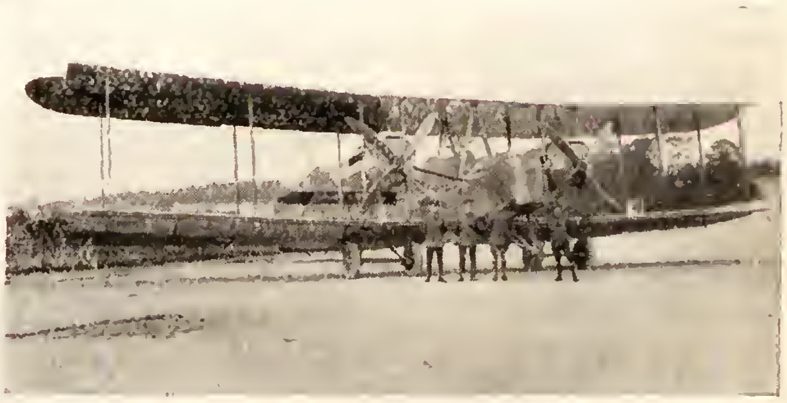

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Jan. 24th-Feb. 27th. 1920.

The first Aeroplane to fly from Cairo to South Africa (*Bulawayo*).
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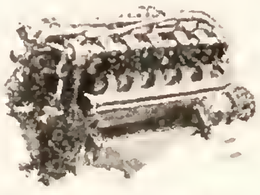
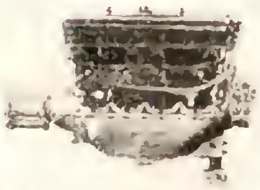

Rolls-Royce Eagle 8

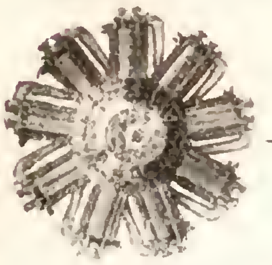
D.H.9A

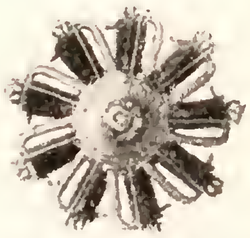

300 h.p. Hispano Suiza

27/60 h.p. "Cirrus"

Avro type 504K

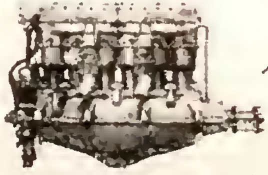
Bristol Fighter

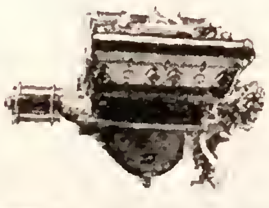

200 h.p. B.R.2.


110 h.p. Le Rhone

D.H.9

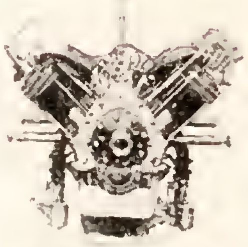
Sopwith Snipe


240 h.p. Siddeley "Puma"


210 h.p. Viper

Martinsyde A.D.C.1.

D.H.9 Seaplane


120/140 h.p. "Airdisco"

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The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

COMMITTEE MEETING

A meeting of the committee was held on Wednesday, February 17, 1926, when there were present: Lieut.-Col. F. K. McClean, A.F.C. (in the chair), Ernest C. Bucknall, Lieut.-Col. M. O. Darby, Wing-Commander T. O'B. Hubbard, M.C., Lieut.-Col. M. O'Gorman, C.B., F. Handley Page, T. O. M. Sopwith, and the Secretary.

Election of Members.—The following new members were elected:—

Pilot Officer Theodore Newman McEvoy.
Sqdn.-Ldr. Harry Stewart.
Pilot Officer Geoffrey Luis Worthington.
Flying Officer Cecil James Pooley.
Flight-Lieut. Alfred Montague Blake.
Sqdn.-Ldr. James Milne Robb.
Flying Officer St. John Fitzgerald Wintour.
Sir John Phillips Rhodes, Bart., D.S.O.
William Allen.
Alan Bruce Hamilton Youell.
Alan Goodfellow.
Edward Cyril Bowyer.
Walter Theodore William Ballantyne.
Flying Officer Godfrey Webster Dean.
Flight-Lieut. Stanley Miles Park.
James Alfred McKelvie.
Flight-Lieut. Martin George McLeary Cahill-Byrne.
Edwin John Dilnutt.
David Leonard Hollis Williams.

Reports from Committees.—Reports from the House and Finance Committees were received and adopted.

Britannia Trophy.—It was unanimously decided to award the Britannia Trophy for the year 1925 to Mr. A. J. Cobham, whose flight with Air Vice-Marshal Sir Sefton Brancker from London to Rangoon (Burma) and back was considered the most meritorious performance by a British aviator during the year. Mr. Cobham left London on November 20, 1924, and arrived back on March 17, 1925. The machine was a D.H.50, with 230 h.p. Siddeley Puma engine.

Private Flying.—Mr. F. Handley Page presented the report of the Sub-Committee on Private Flying. The report was adopted, and it was decided that the Sub-committee—F. Handley Page, Lieut.-Col. M. O. Darby, Maj. Hemming, Sqdn.-Ldr. M. E. A. Wright, and H. E. Perrin—should represent the Royal Aero Club at the Air Ministry Conference.

Gift of £1,000 for Light Aeroplane Clubs.—The Secretary reported that he had attended a meeting of the Petroleum Distributors' Committee, when they had handed to him on behalf of the Anglo-American Oil Co., Ltd., British Petroleum Co., Ltd., Redline Motor Spirit Co., Ltd., and Shell-Mex, Ltd., a cheque for £1,000, to be applied for the purpose of encouraging light aeroplane clubs under the Air Ministry scheme.

It was unanimously decided that a letter of thanks be sent to the Petroleum Distributors' Committee.

Aviator's Certificate.—The following aviator's certificate was granted:—

7981. William Thomas Walton, Junr. January 19, 1926.

Appointment of Timekeepers.—The following official timekeepers were appointed for 1926: A. G. Reynolds; A. V. Ebblewhite; Col. F. Lindsay Lloyd, C.M.G., C.B.E.; F. T. Bidlake.

Offices: THE ROYAL AERO CLUB,
3, CLIFFORD STREET, LONDON, W. 1.
H. E. PERRIN, **Secretary**

PRIVATE FLYING

Discussion at Royal Aero Club Dinner

"Private Flying" was the subject under discussion at the fourth monthly house dinner of the Royal Aero Club held on Wednesday of last week, February 17. As on previous occasions, the dining room was filled to the limits of its capacity, and we learn that very large numbers of applications for seats had to be refused because of lack of space. Readers wishing to make sure of being able to attend the next dinner should keep this in mind, and should apply for seats early in order to avoid disappointment.

His Grace the Duke of Sutherland was in the chair, and before opening the debate, he stated that since last he attended one of these functions he had travelled some 8,000 miles. During his trip he had had an opportunity of seeing some of the work of the French air service, and at Casablanca he had the good fortune to meet the Spanish fliers who were then on their way to South America, a very meritorious journey, which had since been successfully completed. Before calling on Capt. Courtney to open the debate, His Grace said he must ask speakers taking part in the discussion to confine themselves, as far as possible, to a period of five minutes each, as it was hoped many would wish to speak and there would not be time for long speeches.

Capt. F. T. Courtney said he was faced with the difficulty of having to rely upon some notes which he could not read, and which dealt with something that did not exist. He had been a private aeroplane owner for three years, and in that time, owing to all the various restrictions he had flown his machine *once*. When the present regulations were drawn up they were intended to protect flying and also to protect the general public. Nowadays he thought the main idea was to slack off the regulations a bit so as to allow private flying to start. Flying had to be made safe, and the best way to make it so was to get in as many flying hours as possible, thus learning from experience where to look for trouble. The present regulations should be removed and the whole question should be reconsidered in the light of modern conditions.

He would divide the regulations into two classes, the essential and the unessential. Among the former he would include registration and licensing. Heavy penalties should be imposed for transgression. On the question of the rules of the air an examination was, he thought, essential. Otherwise, when we got large numbers of machines flying there was risk of trouble. With the medical examination he had no patience. It did not matter whether a man who intended to become a private owner suffered from certain drawbacks, such as near-sightedness, if he was able to make good landings. A competency test of actual flying skill would tell them all they wanted to know about the private owner, and he thought the medical examination entirely superfluous. As regards the question of third party risks, he suggested that insurance might be carried out on club lines.

Turning to what he termed the unessentials, Capt. Courtney devoted a good deal of time to the question of the Certificate of Airworthiness. The view had been advanced that the constructors of the machine should issue the C. of A. With that view he did not agree, since the owner might damage his machine during use, and it would be unfair to expect the constructor to take the responsibility. On the subject of the investigation of accidents, he failed to see why such an investigation was necessary. At present, if a man damaged his fuselage in landing, he was not permitted to remove the machine until sundry officials had examined it. If a man bent the front axle of his motor-car he was not expected to leave the car in the road. He simply found out where the nearest garage was and made arrangements to have the car taken there. As regards third party risk, a car was infinitely more dangerous than an aeroplane.

Dr. Whitehead Reid, who has been a private owner of aeroplanes for a number of years, and has used them for pleasure flying, said what we had to do was to encourage people to fly for amusement. Popularisation of flying was most important, and in order to do that it was essential to demonstrate that flying was not risky, nor difficult. He would suggest that the Air Ministry should send out propaganda pilots on "Moths," for instance, to take up people and let them handle the controls so as to demonstrate how easy it was to fly an aeroplane. He did not suggest that one should let them land the machine. (Laughter.) It would not cost a great deal to send a couple of dozen "Moths" around to seaside resorts to take up people for nothing.

One stumbling block to private flying was the cost. This was high because so few machines were produced, and could only be reduced if there was a large demand. He thought a fairly easy medical test should be asked for and also a small flying test. With regard to accidents, he suggested that a lot of useful information could be disseminated if the Air Ministry were to issue the results of accidents investigations on some of the beautiful little green papers to all owners of aeroplanes. Insurance was a serious problem. Hitherto the fees had been high, but they were now becoming more reasonable.

Major Mayo agreed with Capt. Courtney that the present restrictions should be removed, but he did not agree that some should remain. He personally would like to see *every* restriction removed, and proceeded to show the absence of need for restrictions by drawing comparisons with the driving of motor-cars. Here there was no medical examination, yet the number of unfit persons who took out licences was very small. Those who were dangerous on the roads were not the deaf and blind and dumb, but the road hogs. The same would apply in the air. There appeared to be something to be said for the rules of the air examination, but the same result could be attained without imposing an examination, namely, by penalties for violating the regulations, as was done on the road. The same with flying tests. No test was demanded from a driver of a car, and none should be demanded from a pilot. Accidents on the roads were not due to inexperienced drivers, but to reckless drivers. He would like to see the removal of the C. of A. and of the periodic inspection. This was in no way a criticism of the manner in which the present regulations were being handled by the A.I.D., who were bound by the system.

Flight-Lieut. Soden (who has used an Austin "Whippet" for private touring for years) expressed himself in favour of "washing out" the restrictions as applied to private flying, at any rate for a year or so, until they saw what the effect was. After that period the position might have to be considered. The trouble with private flying was that at the moment there was not a machine in the country which a man could afford to buy. Why, he asked, should a de Havilland "Moth" cost £885? Unless they could bring the cost down they might as well "pack up." On the vexed question of the C. of A. and inspection, etc., the Air Ministry restrictions should be removed. Surely by now a few of our constructors should know how to build machines that did not fall to pieces in the air. The Air Ministry should order machines in batches so as to enable constructors to bring the price down.

Capt. Goodman Crouch said he was somewhat amused at Capt. Courtney's statement that he had owned a machine for three years and had only flown it once. As the C. of A. was issued to Courtney nearly three years ago, his failure to fly the machine more often could scarcely be blamed on the C. of A. As regards the suggested relaxation of the present restrictions, he thought they *could* get ahead, especially in the manner in which they put the question: Is this machine safe? The trouble at present was not so much with the restrictions as with the manner in which they were applied. As an instance he quoted the example of a machine which had been passed for flying, and was standing on the aerodrome ready to go up. The aerodrome at the time was covered in snow and as there was some likelihood of the wheels sinking in the constructor wished to substitute larger wheels. The Air Ministry representative, who incidentally was from his (Capt. Crouch's) department, refused to sanction the substitution, because on the drawings by which he had passed the machine the smaller wheels were specified. Now that official was perfectly right. Under the regulations he was *not* entitled to sanction the exchange of wheels, although it would have been perfectly safe to do so. Consequently the machine could not be flown. The fault was not with the man but with the system. The man should be given a certain amount of latitude in using his discretion.

As to the C. of A., he did not see why certain firms should not be approved by the Air Ministry to build and inspect their own machines. One thing he would like to plead for in connection with the forthcoming meeting between the Air Ministry and the Royal Aero Club to discuss the regulations governing private flying, and that was that they should, before approaching the Under Secretary of State for Air, attempt to reach a unanimous decision as to what they really did want. Unless they were agreed it was obviously very difficult indeed for the Under Secretary to decide.

In conclusion he asked permission to touch upon a point which was not under discussion that evening, but which he thought would be of interest. Concerning the load factors to be used on the machines built for this year's light 'plane competitions, an official announcement might be expected shortly, but in the meantime he had been permitted to state that the factors applying to machines requiring an aerobatic's certificate would be suggested, but modifications would be permitted. In this way they thought a sufficient safeguard as to strength would be achieved. The actual factors would depend upon speed. For 80 m.p.h. machines they would be 6 and 4, with 2 for diving. For higher speeds the factors would be correspondingly higher.

Capt. Geoffrey de Havilland said he had a lot of notes, but most of them did not seem to apply. From the constructors' point of view, the suggested modifications in the regulations boiled down to the question of the C. of A. There was a certain tendency at present to treat constructors as fools, and as being somewhat dishonest. That should be remedied. It should be made quite clear, he said, that he was not blaming individuals or officials. It was the system that was at fault. Altogether there had been too much Government interference with constructors, and he very much doubted whether the present standard of excellence of motor-cars would have been attained under Government control. Constructional firms were quite willing to undertake the responsibility for their machines, and one result of absence of official interference would be a reduction of something like 20 per cent. in the cost of machines.

Mr. Geoffrey Dorman said he had recently bought a motor-car, a very modest one, it was true, but still a motor car, and his experience had been that it required infinitely greater skill to drive a car on tram lines than to pilot an aeroplane. During the last few weeks he had crashed into several tram cars, omnibuses and pedestrians, and nothing as terrifying as that had ever happened to him in the air. Personally he would very much like to see the whole position reversed, applying all the present aircraft restrictions to motor cars, and the air relieved of all restrictions.

Flight-Lieut. Boyes thought the cost was the main snag. The first cost was high, partly on account of Government inspection. Insurance was high because the insurance companies had hitherto had very little data to go upon. Upkeep costs were high, mainly due to landing fees and housing charges. The actual running costs were not excessively high. He suggested that a great deal of assistance would be given if the Government were to throw open all licensed aerodromes to private owners free of charge. Private aerodrome owners might help by throwing open their aerodromes for a year or so free of charge, until things got going. He agreed with Capt. Courtney that the competency tests would do all that was necessary, no medical examination being required. The responsibility for the C. of A. should be on the constructors, and their inspectors should examine the machines after about 100 hours' flying or once a year in case of a machine that had been but little used. At the same time, he thought owners should have the right, did they so wish, to call in official inspectors, whose decision should be final. This precaution, Lieut. Boyes said, might be necessary later when construction firms might come into existence which were less conscientious than existing ones.

Lieut. R. L. Preston also referred to cost as being the main obstacle, and made the suggestion that something might be done in the way of popularising private flying if a firm like A.D.C. Aircraft, Ltd., who, he understood, held large stocks of aeroplanes and engines, were to make some arrangement to hire them out at very low rates, provided those who wished to fly them undertook the payment of the insurance. Mr. Preston then briefly referred to the formation that day of the Private Owners' Club, which had ten members, all of whom owned aeroplanes. Fuller particulars of the formation of this club will be found elsewhere in this issue of FLIGHT.

Capt. F. L. Barnard considered the Private Owners' Club a somewhat curious affair, and said he was irresistably reminded of the ten little nigger boys. He said it seemed to him that the discussion had been going round in a form of vicious circle. Machines were expensive because so few were being manufactured, and the reason why so few were being built was that the machines were expensive. He thought the present restrictions might be removed, at any rate by way of a sort of trial run. Capt. Barnard thought that one fact seemed to have been overlooked in the discussion, viz., that there might be various classes of private owners. There was the young man of thirty or so, who would doubtless like to buy sporting aeroplanes much as he now bought small sporting cars, or motor-cycles. There were, however, others who could afford to buy machines and to employ a pilot to fly them, and he had often been asked by passengers on the London air lines whether suitable machines for this purpose existed. He was aware that machines had been built which were intended to meet such a demand, but he still thought that the right kind of machine had not yet been produced for this purpose. To him it seemed that what was wanted was an enclosed machine, in which both the pilot and other occupants were protected against the wind, and as it was important to give a good view it seemed to him that what was wanted was a small twin-engined machine, possibly fitted with a couple of Siddeley-Lynx engines.

As to the suggestion that had been made by Dr. Whitehead Reid that free flights should be given in order to popularise flying, he would remind them that while joy rides were being carried out at five shillings a time there were queues of about 300 people waiting to go up, and he wondered what would happen if the flights were made free. Personally, he would rather see an attempt to popularise joy riding with much larger machines, carrying ten or twenty people at a time.

Colonel Edwards, of the Air Ministry, said he was greatly honoured by having been invited to the dinner, but he had not been able to enjoy the excellent dinner as well as he might have done, because he had been told at the Air Ministry that he was being sent to the dinner to be shot at. He did not quite see the objections to the medical examination, which was no more severe than that required when one wanted to take out an insurance policy. On the important subject of the certificate of airworthiness. he really could not see why this was necessary for private machines. In the past it had been necessary because if a number of accidents had happened in the earlier days of civil flying there would have been a great risk of frightening away the public. So far from considering that placing the responsibility for the machine on the constructors by removing the present C. of A., he thought machines would be infinitely safer. At present the constructors were building to Air Ministry specifications, and if anything went wrong the constructors would very rightly disclaim responsibility, which would rest with the Air Ministry.

Col. Edwards said a good deal had been made of the cost of flying. He had been looking up some figures, and found that for a pilot the cost during the first year varied from £7 3*s.* to £8 9*s.*, and in subsequent years the cost was about £5 10*s.* which figures could not be considered high. As regards the cost of housing, the fee was £2 10*s.* per month. He had that day ascertained that the cost of housing a Wolseley car of 20 h.p. was £2 15*s.* per month, so that the charges for aeroplanes could not be considered prohibitive. The reason for the high cost of private aeroplanes at the present moment was that they were being built in ones, twos and threes, and he pointed out that if Mr. Ford was building his cars in that way each car would probably cost thousands of pounds. Col. Edwards did not see much prospect of a great increase in private flying even if all restrictions were removed. It was a matter of L.S.D., and one could not suddenly push crowds of people into the air. The increase in numbers would have to come in the form of natural evolution.

Capt. Fitzmaurice, of the Irish Free State Air Force, delighted the audience by his charming Irish manner and style. The main points of his argument were that they should remove all red tape (which incidentally was called green tape in Ireland). He thought they could with advantage copy the famous Irish attitude of first asking " Phwat is the Government ? " and having been told that, the reply was " I am agin it." He failed to see why any restrictions were necessary except possibly such as would prevent a lunatic from building a machine and crashing it in Piccadilly Circus or some such place. What they had to do above all else was to make the Empire a flying empire.

Major Dennison, of the Midland Aero Club, did not quite agree with the suggestion to remove all restrictions. He was in favour of retaining the medical examination and also the registration of private aircraft. As regards joy rides and the risk of having enormous queues waiting, he thought the light aeroplane clubs could help a great deal in this matter by arranging for a voucher system for free passengers. Concerning the question of cost, their experience so far had been that the running costs did not seem particularly high, but it was the cost of machines that was too high, and without Air Ministry assistance the outlook as to being able to purchase new machines was not very bright. The cost must come down, and the 20 per cent. reduction which Capt. de Havilland had stated to be possible by removing the present restrictions in the way of C. of A. and inspection, would not anything like meet the case. Housing was not serious, and a charge of 12 shillings per week for garaging a machine could not be considered excessive. The question of insurance was serious, and the premiums must come down. He thought the suggestion that licensed aerodromes should be thrown open to private owners free of charge a very excellent one, and would help very greatly to encourage inter-club flying, which was a phase of flying likely to do much to popularise private aviation.

Colonel Outram, of the Air Ministry, in referring to the question of inspection during construction, said that already every aircraft firm was approved to do its own inspection, and the A.I.D. merely stood by and watched them doing it. On the question of C. of A. he would remind them that in this connection there was a snag in that at present the insurance companies refused to insure machines until they had got their C. of A. What would happen in that case to privately built machines which had no C. of A. ? To bring down the cost he thought it would be essential that some kind of organisation should be established for ordering machines in quantities. Colonel Outram then referred to the question of the lunatic building and flying his own machine, which had been raised by several speakers. His Department had during the last few years had to consider several times this question of letting lunatics fly. In some cases permission had been refused, but in other cases it had been granted, and among the latter the percentage who crashed was very large indeed. To illustrate that it was not altogether a question of a man being an absolute lunatic, Colonel Outram related a case of certain fittings on an Avro having been found weak. New fittings were designed and all owners of Avro machines were notified that this change must take place. All Avro owners were traced except one, who kept on eluding them, but whom finally quite accidentally, Colonel Outram ran to earth in a field in Essex. Without telling the owner of this Avro who he was, Col. Outram, as he expressed it, " Had five shillings' worth " with this pilot, and after coming down he began to ask questions as to why the tail plane fitting had not been changed. The pilot said he was not aware that it had to be changed. although he had had a communication from the Air Ministry about a certain modification, but as he had no drawings of his machine he did not know which part was referred to, and anyway he was not going to trouble to find out. Now the point of this story was that the two fittings required for the tail plane would not have cost more than about ten shillings.

Mr. Handley Page, in one of the wittiest and most amusing speeches he has ever made, kept the party vastly delighted for a considerable time. Unfortunately it is not possible to do justice to Mr. Handley Page's amusing speech, which consisted partly of quotations from the Bible and partly of a satirical defence of the Air Ministry, on whose behalf Mr. Handley Page pretended to be speaking. He finished up by imploring the audience (still speaking on behalf of the Air Ministry) to regard that magnificent edifice that had been built in Kingsway, the miles of corridors and the thousands of offices with large staffs. Was not that a sign of real solid progress ? And yet it was suggested to sweep away with one fell swoop the whole of that magnificent organisation and the whole of that basis upon which the church of aviation. rested.

Colonel McClean proposed a vote of thanks to the Chairman, His Grace the Duke of Sutherland, and the evening came to a close with a few remarks by the Chairman.

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Spanish-American Republics for Aeronautical Congress

The Spanish Government has issued invitations to the Spanish-American Republics to attend an aeronautical congress which will be held in Madrid next October.

The Spanish Transatlantic Flight : Another British Contribution

We now learn that Comandante Franco was aided by yet another British " Accessory " in his remarkable flight from Spain to South America—for the famous Wakefield " Castrol " oil formed part of the " Lion's " diet. It is reported that the Dornier-Wal " Ne Plus Ultra " has been presented to Argentina by the Spanish Government, so that it would seem that Comandante Franco's adventure is, for the present, at an end.

Air Survey Work in Malay

Mr. Ronald Kemp, Managing Director of the Air Survey Co., Ltd., has recently secured a contract for aerial survey work from the Government of the Federated Malay States. The work will start on the completion of the contract with the Sarawak Government, which is just about to commence. We understand that Mr. Kemp will be paying a short visit to England at the end of April.

THE LONDON-CAPE TOWN SURVEY FLIGHT

Alan Cobham Completes His Task

MR. ALAN J. COBHAM, who, with Mr. A. B. Elliott as engineer and Mr. B. W. G. Emmott as cinematographer, set out from Croydon on November 16 in a D.H.50.J (Siddeley "Jaguar"), with the object of carrying out an aerial survey of the route from London to Cape Town, brought his mission to a successful conclusion last week. Thus, for the second time, has the journey from London, across Africa from north to south, to the Cape been accomplished by air—the first occasion being when Wing-Commander Sir H. A. Van Ryneveld and Squadron-Leader Sir C. J. Q. Brand made the trip in 1920.

Mr. Cobham reached Cape Town on the evening of February 17, having left Bloemfontein that morning and halting at Beaufort West *en route*. Needless to say, his reception was a remarkable one, there being thousands of spectators present, whilst Parliament had suspended its sitting that afternoon in order that members might welcome the three aviators.

The following day they were entertained at luncheon by the Civic Authorities, at which there was a distinguished gathering. The Government was represented by Dr. Malan (Minister of the Interior), and Mr. Boydell (Minister of Defence) proposed the toast of the airmen. Mr. Cobham, in responding, said that the actual flying was the most restful part of the trip. He thought that the greatest opening for civil aviation in South Africa was the development of the light aeroplane in the hands of the private owner. In South Africa they had vast distances and tremendous isolation—disastrous as far as farmers were concerned—and salvation in this matter lay in the light aeroplane.

THE LONDON-CAPE TOWN SURVEY FLIGHT: Mr. Alan J. Cobham (left), Mr. B. W. G. Emmott, the cinematographer (centre), and Mr. A. B. Elliott, the engineer (right)—and the D.H.50.J Siddeley "Jaguar" combination—who arrived safely in Cape Town on February 17

It is stated that after thorough overhauls have been effected, Mr. Cobham intends to start on his return flight this week, and he hopes to make the complete journey in record time.

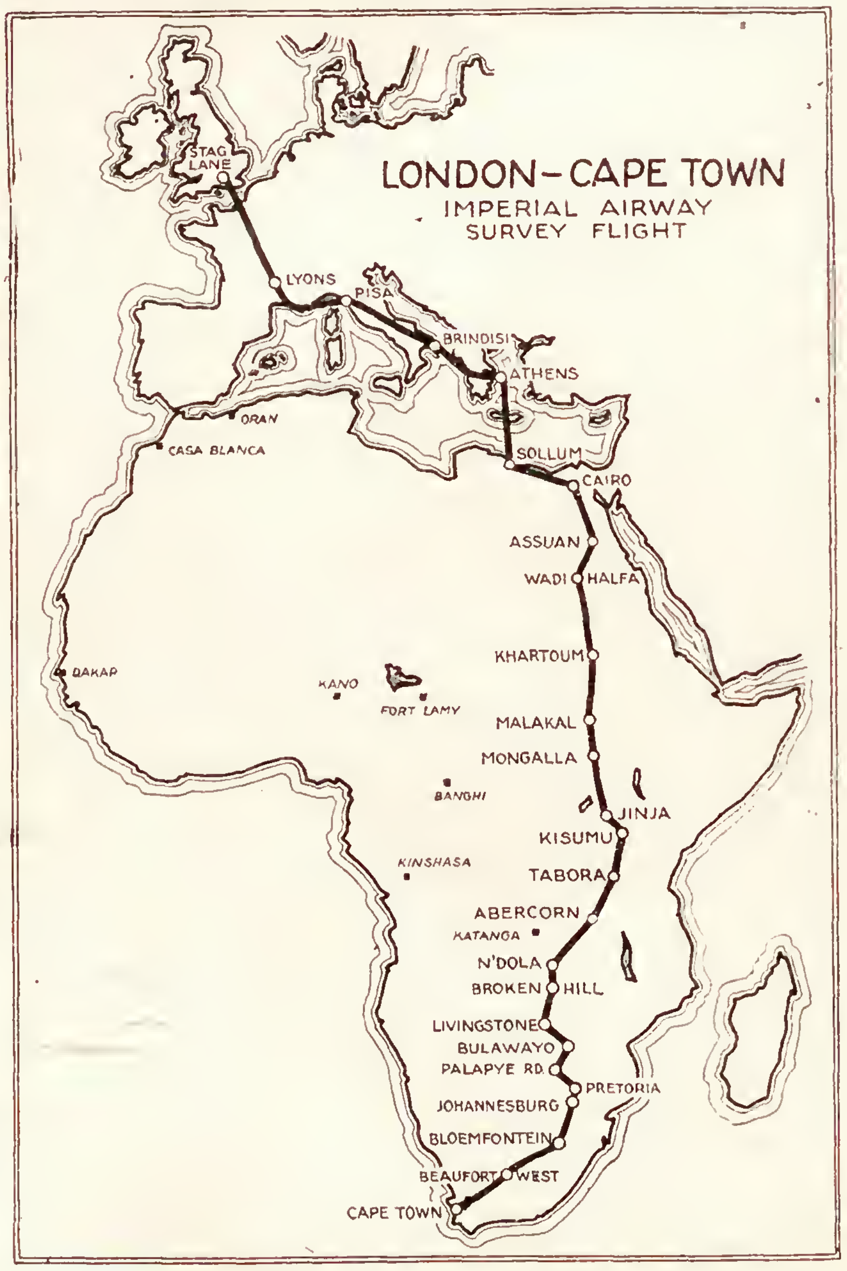
While the outward journey has occupied a total time of four months, it must be remembered that no attempt was made at covering the 8,020 miles (this is the scheduled distance, actually it is more) in record time, for the sole object of the flight was to survey, as thoroughly as possible, the London-Cape Town route, and to consult or advise various interested parties *en route* on the subject of commercial air services. In fact, in this respect we are given to understand that Mr. Cobham has accomplished a considerable amount of spade work, both as regards an Imperial air route and the establishment of local air lines along the route. Again, it should be noted that his total flying time for the flight works out at about 90 hours or 3¾ days, as against the 17 days taken in the case of the fastest sea routes.

However, in every respect this flight is without doubt a magnificent accomplishment, both as regards man and equipment. Cobham's prowess and efficiency in exploits of this character need no comment, whilst the behaviour of the D.H.50J. machine (the actual machine, by the way, but modified, on which he flew with Sir Sefton Brancker to Rangoon and back) and its Siddeley "Jaguar" engine (plus "K.L.G." plugs) have yet again demonstrated the high quality of British aircraft. Mr. Cobham has expressed nothing but praise for engine and machine throughout the whole trip, and has referred specially to the effectiveness of the "Titanine" dope, which has withstood the varying and trying conditions. He also gives praise for the all-important matter of fuel supplies, for not only did he find ample supplies of "B.P." spirit and Wakefield "Castrol R." all along the route, but both these necessities gave entire satisfaction.

Perhaps it may be as well if we give on this occasion a simple log of the flight from start to finish. This, including the distance completed at each stage, is as follows:—

1925.

Nov.	16.	Stag Lane, Croydon–Le Bourget	(240 miles).
,,	17.	Le Bourget–Marignane ..	(640 ,,).
,,	18.	Marignane–Pisa	(925 ,,).
,,	19.	Pisa–Taranto	(1,400 ,,).
,,	20.	Taranto–Athens	(1,765 ,,).
Dec.	6.	Athens–Sollum	(2,215 ,,).
,,	7.	Sollum–Cairo	(2,605 ,,).
,,	16.	Cairo–Luxor	(2,825 ,,).
,,	18.	Luxor–Assuan	(3,085 ,,).
,,	20.	Assuan–Wadi Halfa	(3,275 ,,).
,,	21.	Wadi Halfa–Atbara	(3,605 ,,).
,,	22.	Atbara–Khartoum	(3,755 ,,).
,,	28.	Khartoum–Malakal	(4,185 ,,).



Sketch Map of the London-Cape Town Flight.

1926.			
Jan.	2.	Malakal–Mongalla	(4,545 miles).
,,	10.	Mongalla–Jinja	(4,890 ,,).
,,	13.	Jinja–Kisumu	(5,000 ,,).
,,	18.	Kisumu–Tabora	(5,400 ,,).
,,	19.	Tabora–Abercorn	(5,685 ,,).
,,	20.	Abercorn–N'Dola	(6,030 ,,).
,,	23.	N'Dola–Broken Hill	(6,140 ,,).
,,	29.	Broken Hill–Livingstone ..	(6,430 ,,).
,,	31.	Livingstone–Bulawayo ..	(6,670 ,,).
Feb.	2.	Bulawayo–Pretoria	(7,100 miles).
,,	4.	Pretoria–Johannesburg ..	(7,135 ,,).
,,	15.	Johannesburg–Kimberley ..	(7,415 ,,).
,,	16.	Kimberley–Bloemfontein ..	(7,495 ,,).
,,	17.	Bloemfontein–Cape Town ..	(8,115 ,,).

Throughout the flight Mr. Emmott has taken numerous photographs and films of various places and items of interest, and this film, when "shown," should not only provide exceptional interest, scientific as well as popular, but should also provide excellent material for British aviation propaganda.

SIR SAMUEL HOARE AT CAMBRIDGE

Speaking at a meeting of the Cambridge University Aeronautical Society on February 17, Sir Samuel Hoare said he was particularly glad to meet the members at a time when the University was showing an added interest in aviation in connection with the starting of the Cambridge University Air Squadron. He congratulated them upon the successful start that had been made, and would tell them that there were few recent developments in the field of British flying to which he looked with greater hope and confidence than the new movement started there and at Oxford. They had already set up the framework of their organisation, their squadron with its special appeal to those who wished to become Air Force officers, with its opportunities for the study of the technical side of aeronautics for those who were interested in technical questions, and with its stimulus to those who desired to push further the line of progress in the almost limitless field of scientific research. Good luck to the work of the Squadron in all these three directions.

He was there, proceeded Sir Samuel, not only to congratulate the club, but to say something about British flying, but he felt some hesitation in doing so before that audience, as he was no expert either upon the scientific or practical side of flying. He would therefore give them the general impressions of an ordinary person who had become connected with flying a short time ago, and who asked himself the question—what part is flying going to play in the life of the nation and of the Empire ?

Most people have now grasped the fact that the invention of flying was revolutionising our system of defence. It was to be presumed that year by year, as the aeroplane and its armament became further developed and as the Air Forces of the Great Powers became stronger, this fact would become more and more apparent. Whilst he felt sure that the uses of air power would be extended in the field of home and Imperial defence on the ground of economy, if for no other reason, neither he nor the Air Staff held the foolish view that air force was the only force that mattered, and that navies and armies were obsolete.

The defence problem of the future was not the elimination of one or other of the three fighting Services, nor the merging of all these into a single service, but rather a more intelligent division of labour under which the best and most economical use would be made of each.

Regarding the part civil aviation would play in our lives in the near future, he found himself torn between the optimists, who believed that civil aviation could do everything, and the pessimists, who were certain it could do nothing. He thought civil flying was considerably further developed than was railway travelling 100 years ago, and motor travelling 25 years ago. In a space of six or seven years civil flying had established itself as a regular means of transport in every civilised country of the world. Year by year progress was being made with the solution of the problems of safety and regularity. At present there were two practical difficulties still to be surmounted : flying at night and flying in a fog. They had made substantial progress in both directions, and he advised any interested in the question to go to Croydon and see what was being done with the lighting of the aerodrome and with certain other improvements.

There was still, however, one outstanding problem, and it was no use underrating it—the difficulty of expense. Organised civil flying was nowhere self-supporting. Everywhere it needed Government subsidies. If civil flying was going to play a really great part in the life of the nation, its cost would have to be reduced to an economic self-supporting figure. It was because he believed that result would be eventually reached that he changed the system of yearly subsidies to the present system of a ten-year subsidy, during which civil flying would have a chance of establishing itself as an economic proposition.

Another difficulty, he said, was that of building up an air route that would possess such great advantages over the land or sea route as to ensure a sufficient quantity of passengers and freight—an obvious difficulty in a small country like England, where road and railway transport were developed to a unique degree. It could only be met by pushing out air routes over distances so long as to mean a great saving of time in transport. Hence the policy of long-distance flying routes within the Empire.

Sir Samuel then referred to the future Empire air routes, two he had in mind being London-Calcutta and London-Cape Town. Alluding to the airship experiment, which he asked them to follow closely and sympathetically, he said that they were engaged upon it with a full sense of the difficulties and with a keen memory of the disasters behind, and for a year and a-half they had been studying all the lessons of the past and all the available evidence that might be procured from full-scale experiments and scientific research. He hoped and believed that during the lifetime of the present Government the two great airships now being built would be flying safely between England and the distant cities of the Empire.

As regards the part flying would play in industry, Sir Samuel stated that if flying was to be a healthy growth, it must have its established place in the world of industry—there should be the closest possible connection between the Air Force, the Air Ministry and industry generally. At present the difficulty was that the aircraft industry was dependent almost entirely upon the orders of the Air Ministry, but until civil flying developed further he could not see how the position could be remedied. There was a general need for the linking up of our air system as closely as we could with the British industry. It was to be hoped that the experiment started this year with the formation of Auxiliary and Special Reserve Squadrons would create another connection between the Air Force and the industry.

Sir Samuel concluded his speech in reviewing the work, mainly on the science side of the Club in connection with aviation. He referred to the work done by Prof. Jones regarding the stability of aeroplanes, Prof. Taylor in wireless, meteorology and flying, and to those scientists who lost their lives in the cause of flying such as Prof. Hopkinson, Mr. Keith Lucas (Trinity) and Capt. Busk.

Among those present at the meeting were :—Sir Geoffrey Butler, K.B.E., Sir Arthur Shipley, General Costello, V.C., Colonel the Hon. I. M. Campbell, D.S.O., Wing-Cmdr. J. B. Bowen, O.B.E., Prof. C. E. Inglis, O.B.E., Prof. B. Melville Jones. Sir Arthur Shipley proposed a vote of thanks to Sir Samuel Hoare.

Sir Philip Sassoon at Brussels

Sir Philip Sassoon, Under-Secretary for Air, delivered a lecture before the Belgian Aero Club at Brussels on February 20, H.M. the King of the Belgians being present.

R.A.F. *v.* Army (Fencing)

The fencing match, between the Army and the R.A.F., which was fought on February 17, produced some excellent play. Foil, épée, sabre and bayonet were the weapons, and the Army beat the R.A.F. in three out of four of these, viz. : Foil (5 to 4), épée (5 to 4), and bayonet (5 to 4). R.A.F. won sabre (5 to 4).

The Royal Air Force Memorial Fund

The fortnightly meeting of the Grants Sub-Committee was held at Caxton Street, on February 18. Lieut.-Commander H. E. Perrin was in the Chair, and the other member of the Committee present was Mrs. L. M. K. Pratt-Barlow, O.B.E. The Committee considered in all 16 cases, and made grants to the amount of £37 7s. The next meeting was fixed for March 4, at 2.30 p.m.

LIGHT 'PLANE CLUB DOINGS

London Aeroplane Club

THE total flying during the week was 16 hours 25 mins. with one machine only available.

The following members had flying instruction: J. S. M. Michie, R. C. Brighten, R. C. Presland, R. L. Preston, R. P. Cooper, N. James, Sir John Rhodes, S. O. Bradshaw, E. S. Brough, C. E. Murrell, C. H. Gould, A. R. Ogston, W. E. P. Johnson, A. P. Hunt, L. C. J. Mitchell, T. H. O. Richardson, G. Quirk. B. B. Tucker, O. J. Tapper, R. Thomas.

The following Members flew solo: Mrs Eliott-Lynn, P. G. Lucas, Major Beaumont, G. N. Warwick.

Capt. F. G. M. Sparks has now returned from his Instructors' Course at Upavon, and has been passed as an A.I. Certificate.

The Lanchester Motor Co., Ltd., of Birmingham, has kindly presented to the Club a sectioned R.A.F. engine for instructional purposes.

The Lancashire Aero Club

FLYING took place on Tuesday morning, Wednesday afternoon and Saturday and Sunday. Mr. Cantrill and Mr. Scholes gave "dual" to the following: A. Macnair, 1 hr. 10 mins.; H. Jowett, 35 mins.; P. Michelson, 55 mins.; R. Colley, 40 mins.; C. Agar, 50 mins.; R. Williams, 20 mins.; D. Tummers, 45 mins.; H. Stern, 45 mins.; C. Parker, 20 mins.; L. Slater, 25 mins.; A. Goodyear, 15 mins.; J. Chadwick, 25 mins.; D. Dyson, 15 mins.; J. Leeming, 15 mins.

Solo flights by M. Lacayo, 35 mins.; R. Williams, 10 mins.; test occupied 35 mins., solo 45 mins., dual 8 hours 20 mins. Total 9 hrs. 40 mins.

The third Annual General Meeting will be held at the Club Headquarters in Manchester at 7.30 p.m. on March 2.

Newcastle-upon-Tyne Aero Club

Flying report for week ending Sunday, February 21, 1926.—All the weather forecasts have been fulfilled this week. On Monday only a half-hour was completed, Miss Leathart being the heroine, who carried out 30 mins. dual under Major Packman. No flying at all on Tuesday. There was rain almost continuously on Sunday, but five Members flew under instruction, with Major Packman, and three pilots flew solo, though whether for pleasure or a matter of duty is not known.

Total time for the week 20 hrs. 8 mins., made up as follows:—Dual, 16 hrs. 3 mins., solo, 3 hrs. 30 mins. (all "A" pilots); passenger, 30 mins.; test, 5 mins.

The following members flew under instruction, with Major Packman, Miss Leathart, Mrs. Marcks, Mr. MacMillan, Mr. W. Todd, Mr. H. Ellis, Mr. Wardill, Mr. Twine, Mr. L. Smith, Mr. C. Thompson, Mr. Somerville Mr. Bruce.

Solo, Mr. N. S. Todd with Mr. Naylor as passenger, Mr. Baxter Ellis with Miss C. Ellis as passenger, Mr. P. F. Heppell with Mrs. Heppell, Mr. R. N. Thompson with Mrs. Marcks on one flight, other passengers not known.

Major Packham flew with Mr. Alderson as passenger.

The repairs to *Bernicia* are now completed, and, weather permitting, Major Packman will fly it up from Stag Lane on February 26.

To those who patiently listened to the monotonous sound of rain on the roof of the hanger on Sunday, while the machine was flying, the following incident would no doubt prove a welcome break in some cases at any rate.

A member, about to take a passenger for a 15 mins. flight, twice became stuck in the mud when commencing to taxi. After being dislodged for the second time he opened out his engine a little and it was presumed that he intended to taxi up to the opposite end of the aerodrome and turn. He did not do this, however, and the spectators were horrified to see the tail of the machine rise and (much) later the machine took off. Mr. Brown immediately proceeded to light a fire on the aerodrome, and, on alighting, the pilot concerned thanked him profusely for so thoughtfully indicating the change of direction of the wind, and was about to mention that the engine did not appear to be pulling well when he took off. It was then pointed out that the wind had not changed during the flight.

The following Petrol Distributing Companies: Anglo-American Oil Co., Ltd., British Petroleum Co., Ltd., Redline Motor Spirit Co., Ltd., Shell-Mex Ltd., have together handed to the Royal Aero Club the sum of £1,000 which is to be applied for the purpose of encouraging Light Aeroplane Clubs under the Air Ministry scheme.

It is the intention that this sum shall be used in connection with the purchase of new aeroplanes, but it is a condition that before any Club obtains assistance from this fund it must first satisfy the Royal Aero Club that it has already been able to obtain from other sources a considerable portion of the necessary money. It is also stipulated that the type of aeroplane to be purchased is to be approved by the Air Ministry.

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BRITISH PRIVATE AIRCRAFT OWNERS' CLUB

THE inaugural meeting of the British Private Owners' Club took place at 3, Clifford Street, on Wednesday, February 17, by kind permission of the Royal Aero Club.

The objects of the formation of the club are:

1. To bring together as members of the club persons owning aircraft exclusively for private purposes; and to provide an organisation whereby private aircraft owners can meet together to exchange views and discuss aeronautical affairs. This is being done by having a club dinner every other month.
2. To eventually promote flying contests amongst private aircraft owners and offer prizes. It is hoped, if possible, to arrange a one-day air race meeting during 1926.

Membership is only open to ladies and gentlemen who own or have owned, as amateurs, their own private aircraft. All members at present serve on the Committee. The subscription is 10*s*. (ten shillings) per annum with no entrance fee. Mr. David Kittel, Artillery Mansions, Westminster, is acting as Hon. Secretary and Hon. Treasurer.

At the inaugural meeting the following Founder Members were elected:

Captain G. de Havilland, M.B.E. (D.H. Moth).
Captain H. Broad (Avro).
Captain F. T. Courtney (Boulton and Paul P. 9).
R. L. Preston, Esq., Coldstream Guards (B.E.2.E.).
Wing Commander Weir (D.H. 51).
Wing Commander Wynne, O.B.E. (D.H. Moth).
Flight Lieut. Hamilton, M.B.E., D.F.C. (Martinsyde).
Flight Lieut. Soden, R.A.F. (Austin Whippet).
Doctor Whitehead Reid (S.E. 5).
David Kittel, Esq. (D.H. Moth).
Dudley Watt, Esq. (Sopwith Grasshopper).

(Name in brackets indicate the machine of the private owner).

A meeting and dinner of the club will take place on Wednesday, April 7. Members will be notified of full particulars.

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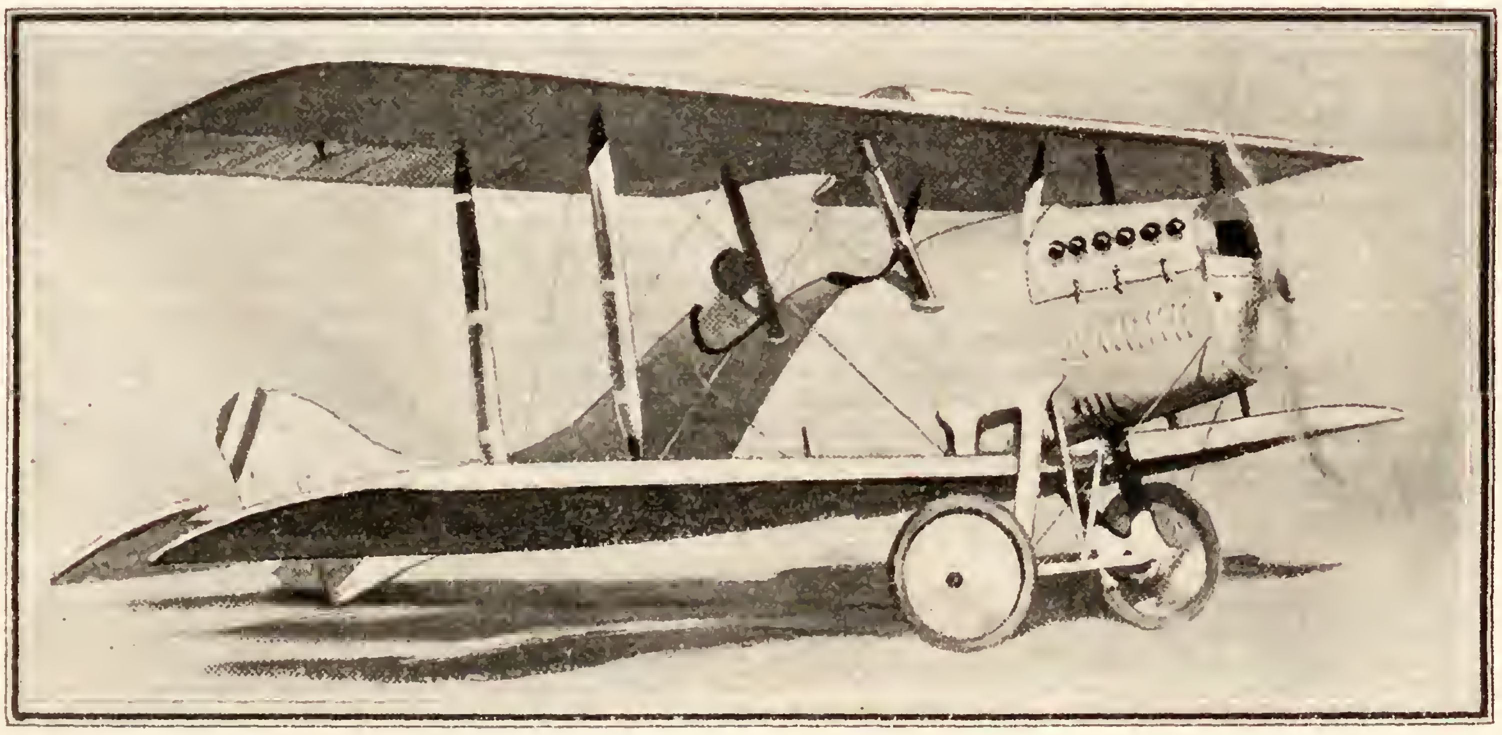

AN ITALIAN "SEMI-LIGHT 'PLANE": The Montorfano "R.7" two-seater biplane, constructed by the famous Italian shipbuilding firm, Cantieri Navali di Monfalcone. It is fitted with a 60 h.p. Combi 6-cylinder water-cooled engine, and has the following characteristics:—Span, 28 ft.; O.A. length, 20 ft.; area, 258 sq. ft.; weight empty, 815·8 lbs.; weight laden, 1,323 lbs.; weight/h.p., 22 lbs.; weight/sq. ft., 5; speed range, 37-83·7 m.p.h.

The AIRCRAFT ENGINEER

FLIGHT ENGINEERING SECTION

Edited by C. M. POULSEN

February 25, 1926

CONTENTS

	PAGE
Aircraft Performance. By J. D. North, F.R.Ae..S.	13
Metal Spars. By J. D. Haddon, B.Sc., A.F.R.Ae.S.	15
An Interesting Undercarriage Leg	18
Stalled Flight and Control. By Frank T. Courtney	20
In the Drawing Office: Stream-Line Struts. By Lt.-Col. J. D. Blyth	21
Technical Literature	22

OUR CONTRIBUTORS

Mr. J. D. North will be too well known to our readers to require any introduction here. Perhaps he is best known for his work on all-metal, and more particularly all-steel, construction of aeroplanes, a form of construction in which the firm with which Mr. North is connected—Boulton and Paul, Ltd.—has specialised for several years. We regard ourselves as being extremely fortunate in having obtained from Mr. North the promise of a series of articles, the first of which appears in the present issue. For a start, Mr. North will deal, not with metal construction, but with the subject of performance, the reconsideration of which, in the light of the vortex theory and dimensional theory, is considered essential to the determination of optimum types of construction.

Mr. J. D. Haddon, who has, we understand, been associated with several firms during their earlier work on metal construction, contributes an article on the design of metal spars of the type built up from strip. The subject is one that is coming to the fore very much at the present time, and the example given should be of material assistance to those whose duty it will be during the next year or two to produce satisfactory spars of this type. Mr. Haddon also gives a few words of advice on the design of rollers, and illustrates his method by an example.

Mr. F. T. Courtney is one of Great Britain's best known test pilots, and has flown a very large variety of machines. He holds some very pronounced views on the subject of control and stalling (as on most other subjects), and, although the article which he has contributed is not a technical one, we have thought ourselves justified in publishing it in THE AIRCRAFT ENGINEER, since this will give technical experts an opportunity of replying. The article is of rather a controversial character, and doubtless will call forth a lively correspondence.

"In the Drawing Office" is a section which we propose to devote to time-saving "dodges," and the Editor will welcome contributions for this section. In this issue Col. Blyth gives a short cut to the calculation of areas and moments of inertia of streamline struts.

AIRCRAFT PERFORMANCE.

By J. D. North, F.R.Ae.S.

There is no property of the aeroplane flying machine which arouses greater interest in all associated with its design, manufacture, or use, than what we have come to call "performance." Performance, of course, is a very vague word. It is vague in the sense that the term manœuvrability is vague, and the properties of manœuvrability and performance merge into one another and overlap. If we consider manœuvrability to mean the capacity of an aeroplane to take up a fresh position in space, we are bound to take into consideration its properties of movement in two of the six degrees of freedom, viz.:—its horizontal and vertical speed. More strictly, we should confine the question of performance to the study of a two-dimensional motion of the aeroplane in its plane of symmetry. If we accept this definition of performance, we can cover the whole question of taking off from rest, climbing and flying at various heights and throttle settings, and we can specify properties within these limitations which will serve to define the requirements of aerodynamic design, except in so far as they may be limited by extraneous considerations, such, for example, as the necessity for rapid angular motion about any axis, or arbitrary limitations of size, or arrangements from considerations of housing, accommodation, or functional requirements such as view, gun power, etc.

In examining the question of performance, it is difficult to find a real starting point. We might assume that the starting point was the user's specification; in other words, that his specification will require the machine to carry a definite useful load, and to be capable of a certain performance (and we shall continue to use this word to mean linear motion in the plane of symmetry) for a given endurance. He will, in addition, require certain economic conditions to be satisfied. This, in fact, really begs the question, since the user's requirements, particularly in military matters, are based, not on some extraneous principles of economics, but on the inherent performance capacity of the aeroplane flying machine. It is, therefore, necessary for the user to know what can be obtained before he can accurately specify his requirements. This is more difficult since, even within the limits as to the meaning of performance laid down, there are an infinite variety of combinations of climb and speed at the disposal of the user. Thus, the grade or class of performance may be interpreted as a rapid and sustained climb to great heights, as if a machine were being designed for taking the altitude record, or, alternatively, it may be interpreted as speed at ground level, as if the machine were intended for special racing purposes. Two aeroplanes to satisfy these conditions would be extremely different. In between these two extremes, there lies a very wide choice in which to combine these two conflicting properties.

When an aeroplane is used for commercial purposes, the choice of policy is perhaps not so difficult. Meteorological and navigational considerations will tend to fix the operational height, or at least the limitations of operational heights to a fairly accurate degree. The economic speed can be assessed with some degree of accuracy and the ground conditions are either known or may be decided upon. At present in civil flying, ground conditions place a quite arbitrary limitation on the design of commercial aeroplanes, and it does not by any means follow that aeroplanes which are designed to meet these conditions are necessarily the best from an economic standpoint.

In military aeronautics, the problem is far more difficult. The measure of requirements is the defensive power to meet a possible offensive and the offensive capacity to operate in the face of other defences. A premium must always be placed on a high grade of performance since the initiative of action will go to those with whom this advantage lies. In offensive aircraft, it may be elected to use this high performance capacity for very high speeds low down, or for operating at great heights. In either case, the defensive aircraft must be designed for one or other of these conditions. It can hardly be expected to compete successfully in both. However high your defensive aeroplanes can fly, they are clearly useless if they cannot overtake offensive machines at their chosen level. However fast they can fly, they are clearly of no use if they cannot reach the level at which offensive machines are operating. This choice of operating height is the very essence of military aeroplane design, determining as it must do, the whole policy of the designer in his endeavour to satisfy tactical requirements. It will be profitable to examine in this issue, Fig. 1, which has been printed in fairly large size so that it may be cut out for future reference purposes, as it will constantly be necessary in thinking of different types of aeroplanes to refer to this figure, which shows the relationship between true air speed and indicated air speeds at various standard altitudes.

This relationship between true air speed and indicated air speed is the fundamental aerodynamic effect of height. It is true that unless some arrangements, such as supercharging, are made to compensate for the change of pressure and temperature with altitude, this change modifies the brake mean effective pressure of the engine, but this has an influence which may be considered, so far as its primary effects on performance are concerned, independently. I have no belief in any system of attack on the problem of performance which aims to set down the *desiderata* in terms of the variables and from that to determine the optima, because the number of variables at the disposal of the designer is so large that completely to take account of them is impossible, while to include so many of them as may render the solution of the differential equations practicable, is to take away the very things which represent the difference between good and bad design. It is true that by studying the primary influence of varying the shapes and proportions of an aeroplane, we may get an approximate position outside the scope of our experience, but in the end better results can, with the assistance of this initial guidance, be attained by the designer, who subconsciously assesses what he may best do with the variables at his disposal. This, in fact, is design which is ultimately an art and not a science in aeronautics, as in all other engineering work. It is only possible, therefore, for us to present the case of varying one thing after another, considering, to start with, the primary and more important factors to get a broad view of the secondary factors, which may be studied as an important refinement later. From the aerodynamic side, we may call the primary factors of an aeroplane the lift and drag of the wings and the drag of the body and other detrimental resistance, and from the engine side, the thrust, the propeller efficiency and the power. The secondary effects include the influence of the slip stream, the resistance and drag of the stabilising organs, such as the tail and the fin, interference and variations of engine speed at full throttle. Of the primary factors, the lift and the drag are associated with the indicated air speed, while the propeller efficiency depends on the true air speed and the thrust on both true air speed and the height, although the conversions of thrust to power depends on true air speed only. In so far as the primary

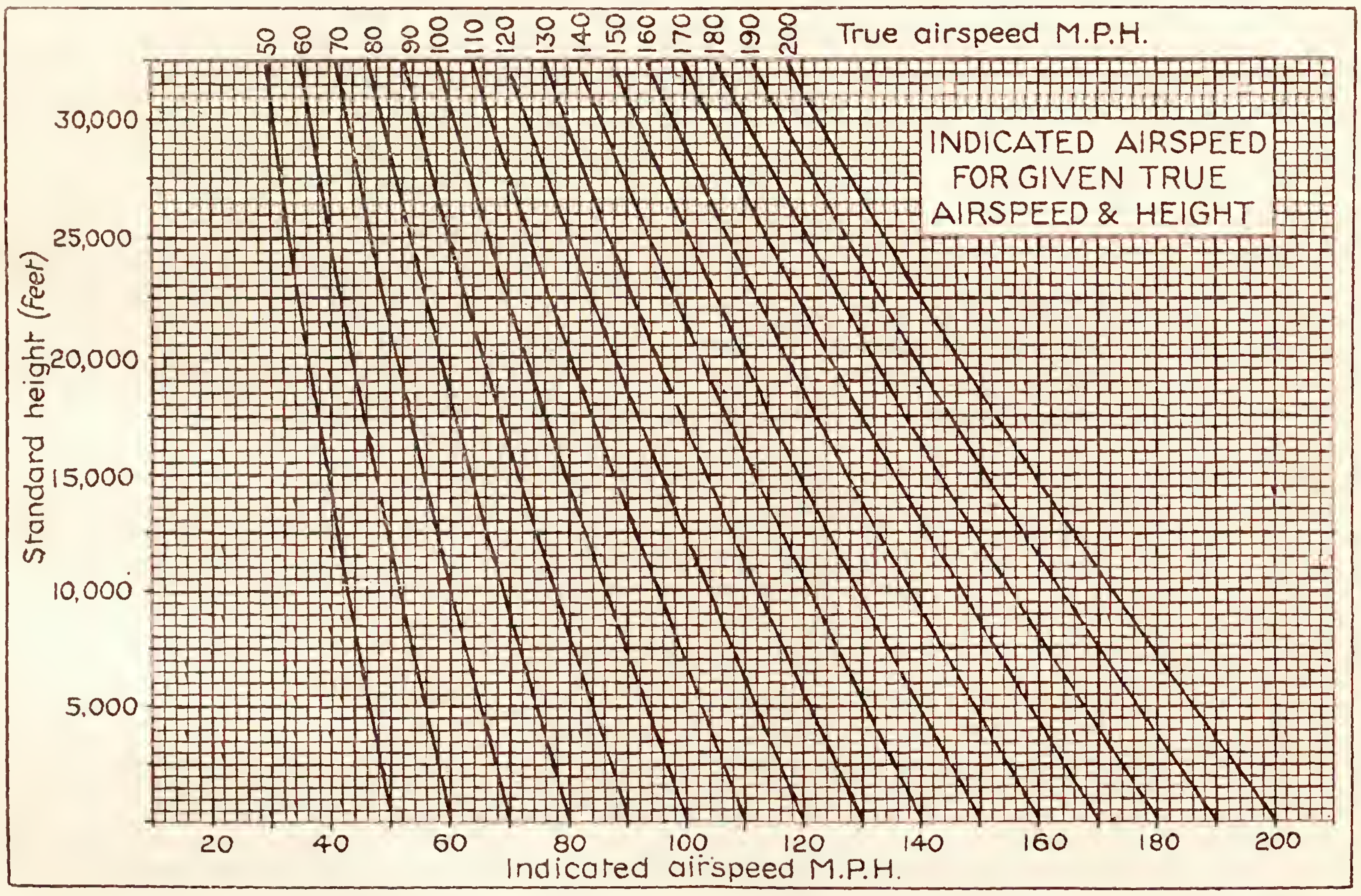

Fig. 1.

R. M. KINDERMAN COLLECTION

aerodynamics of the wings are concerned, the use of the quantitative vortex theory has thrown into its true perspective the whole mass of partially and imperfectly correlated data on wing sections, plan forms and multi-plane combinations. It is hardly necessary to mention that this theory has not enabled any appreciable improvement to be made in wing sections. It does, however, effectively dispose of the many exaggerated claims which have been made, in most cases quite genuinely and disinterestedly, as to the advantages to be gained by particular classes of wing section, or systems for adjusting them, together with many other aeronautical panaceas. I do not desire, in what is purely an engineering article, to discuss the history of the vortex theory. It is sufficient to mention in passing the brilliant and neglected piece of inductive reasoning which is to be found in the early work of Mr. F. W. Lanchester, and the extensive work carried out by Continental mathematicians in placing Lanchester's hypothesis on a quantitative basis, which has been made available to English readers by H. Glauert in certain Reports and Memoranda of the Aeronautical Research Committee and by Max Munk in the publications of the National Advisory Committee for Aeronautics of the United States of America. The former of these two I shall use for purposes of reference, as they are most easily accessible to readers in this country, and contain fairly full reference to the original German work. I propose to consider the quantitative basis of this theory as established. The published experimental evidence is practically conclusive, and if that were not enough my personal experience, and I believe that of all others who have had the matter investigated afford, to me, ample additional confirmation. It is very necessary, in order to use the vortex theory to advantage, to think of wings in terms of those characteristics which the theory indicates to be criteria. So far from this presenting a difficulty, the whole conception and visualisation of wing sections and the mechanism of lift, is so much simplified that one is able to look at experimental results with the same appreciation of their true perspective as one receives from a stereoscopic picture. It is not important from the standpoint of the engineer whether the mechanism of lift on which this theory is based is real or not. If it satisfies our observations it should be enough for the engineer, who, of all people, ought to be content so far as his work is concerned with a metaphysic philosophy. As all the properties of wings are associated with lift, it is necessary to think of the conditions under which a wing operates in terms of its lift coefficient.

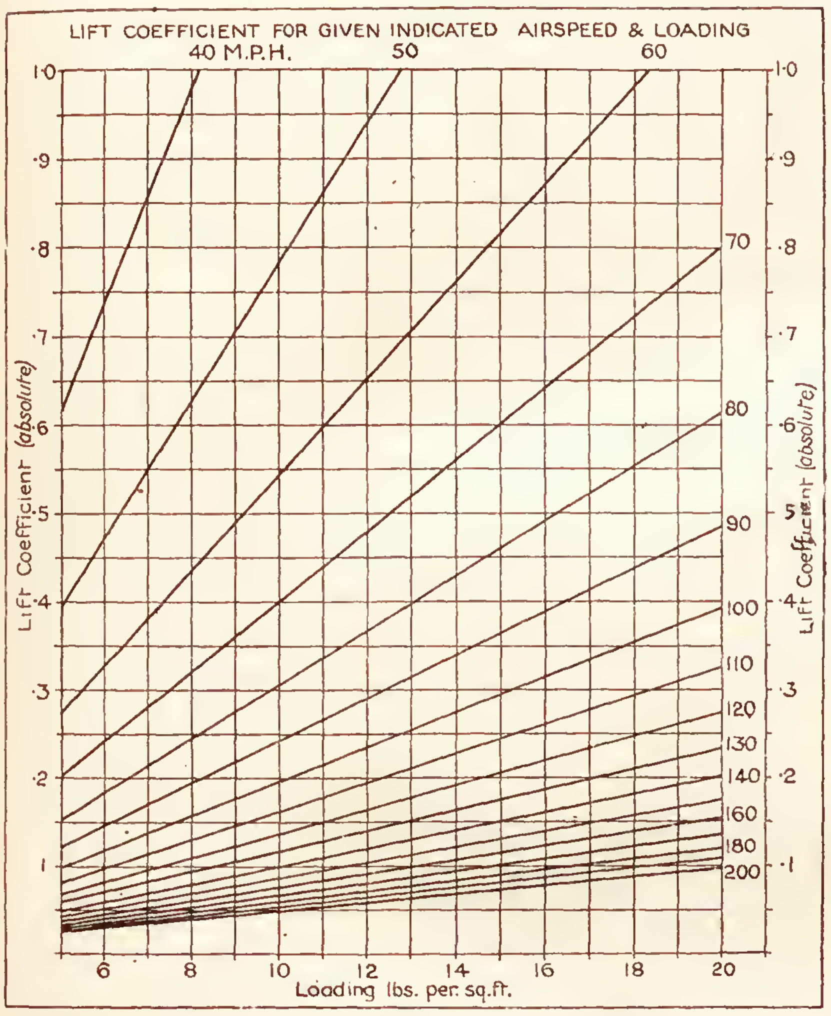

Fig. 2.

Fig. 2 connects the lift coefficient with indicated air speed for various loadings, the lift coefficient being in accordance with the non-dimensional definition. This figure, in conjunction with Fig. 1, will enable the reader instantly to see at what lift coefficient under any reasonable conditions of height and speed the wings of an aeroplane are working for loadings between 5 and 20 lbs. per square foot, and in thinking of, or examining the performance of any aeroplane, it is first of all necessary to find out and fix firmly in the mind the lift coefficient associated with the particular speed and height which is being considered. It thus follows, that so far as the wings are concerned, the specification of performance, in so far as it relates to steady motion in flight, can be associated with the definite values of the lift coefficient.

METAL SPARS.

By J. D. Haddon, B.Sc., A.F.R.Ae.S.

It has been my experience that several firms starting metal construction are spending unnecessary money by designing their first spar section on the trial and error system. Also the man in the drawing office is at a disadvantage, through lack of experience in this type of construction, in stressing, designing rolls, etc. A lot of this could be obviated if the designer had at his disposal certain information, which it is the object of this article to supply.

Fig. 1 shows three typical rolled steel spars.

Metal spars are so varied in design that it is impossible to discuss them all here. However, certain principles are common to all. We will therefore follow the design of one throughout.

Assume a spar is required for a bay 30 in. long (l), 5,000 lbs. end load (P), 120 lbs. per ft. run (w) and bending moments at ends 1,500 ft.-lbs. (Ma) and 1,400 ft.-lbs. (Mb).

The first step is to choose the form our spar is to take. In this connection the following points must be taken into account:—

Edges of metal must not be at points of high stress, *i.e.*, top or sides as Fig. 2 (*a* and *b*). (*b*) would be O.K. if the end had a small radius as Fig. 1 (*a*). Do not allow any flats as in Fig. 2 (*c*) X—X. Two large radii adjacent produce a flat where they meet; always at highly stressed parts put a small radius next to a large, as Fig. 1 (*a*) flange. This is not so necessary in the web where the stress is small.

Maximum radius must not exceed 30t. It is no good taking the figure for tubes. It is obvious that an inch diameter tube will stand a greater r/t ratio than a tubular section say 12 in. diameter made up of several ½-in. radii.

Minimum radius for DTD 16/50 steel is 3t and DTD 16/52 is lt.

Neglect of any of the above will lead to local failure before the spar develops its stress.

Remember that fittings and ribs will have to be attached after the spar is made up.

I have seen spars designed with the one thought that they must stand up to the stress and then handed to the poor draughtsman to incorporate in a wing; with the result that most elaborate and heavy fittings have to be made and in one case rib posts had to be attached before the spar was made up. It generally pays to make the webs of a lighter gauge than the flanges.

Heat treated strip in long length coils supplied by Messrs. Kayser, Ellison & Co., Ltd., cannot at present be got in a greater width than 6½ ins. for 0·015 in. to 0·032 in. thick. and 4½ in. for 0·010 in. to 0·015 in. thick. For fittings and side plates the steel K.E. 169 is supplied in the annealed state up to 7 in. in width.

We will make our spar of the type shown in Fig. 1 (*a*), Let its dimensions be as shown in Fig. 3 (*a*) and (*b*). Dimensions in (*b*) being got by scaling a drawing ten times full size.

Our next procedure is to find the area and moment of inertia.

Area = length × thickness.

R M
COLL

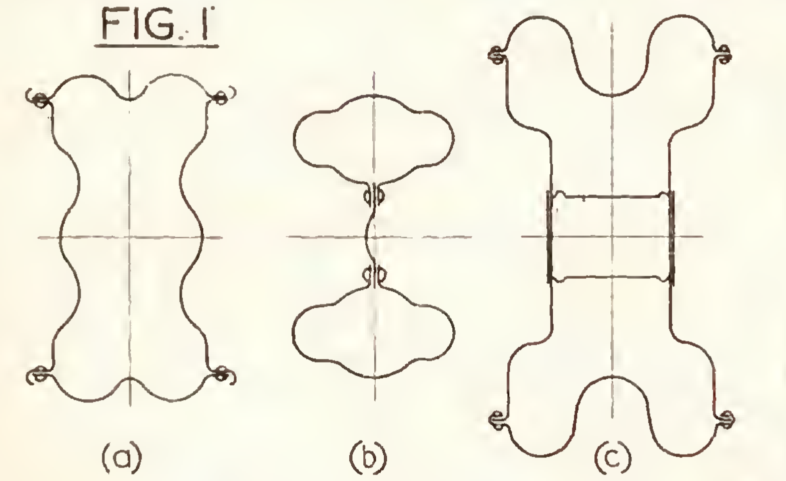
FIG. 1

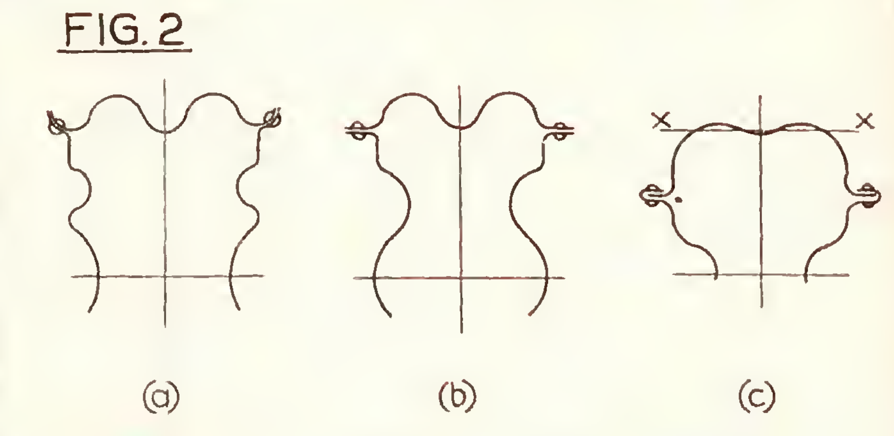
FIG. 2

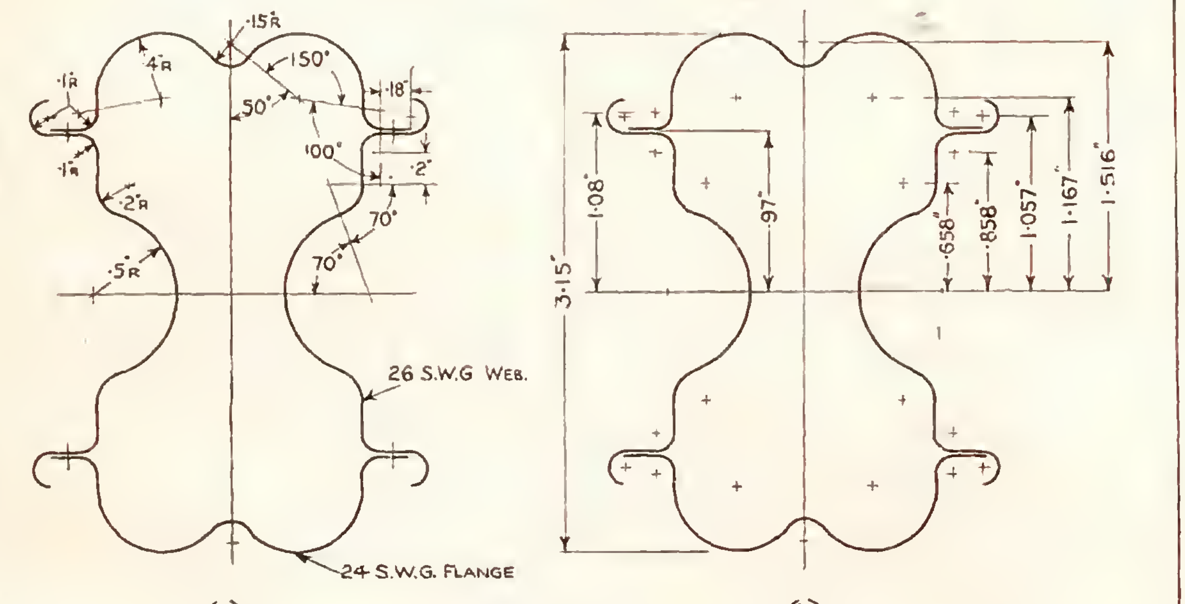
FIG. 3

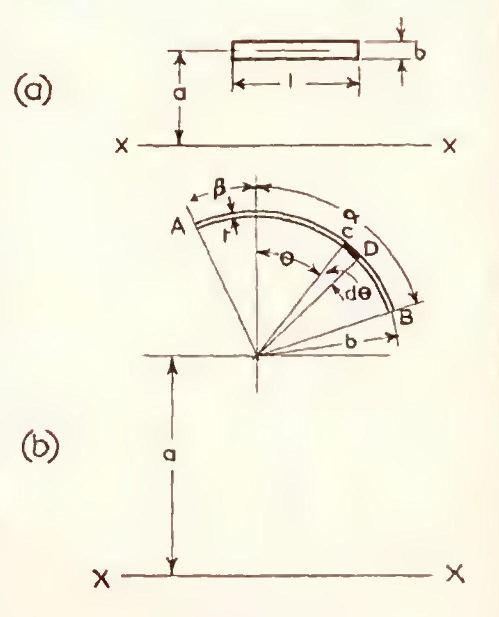
FIG. 4

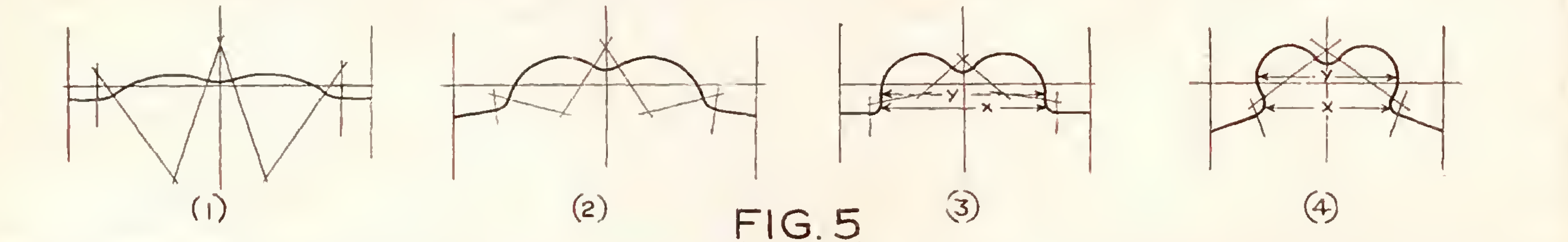
FIG. 5

Length of flange =

$$2\left(\frac{(50 \times 0 \cdot 15) + (150 \times 0 \cdot 4) + (100 \times 0 \cdot 1)}{57 \cdot 3} + 0 \cdot 18\right)$$

$= 3 \cdot 064$ in.

Area of flanges $= 3 \cdot 064 \times 0 \cdot 022 \times 2 = 0 \cdot 1348$ sq. in.

Length of Web =

$$2\left(\frac{(270 \times 0 \cdot 1) + (70 \times 0 \cdot 2) + (70 \times 0 \cdot 5)}{57 \cdot 3} + 0 \cdot 38\right)$$

$= 3 \cdot 41$ ins.

Area of Webs $= 3 \cdot 41 \times 0 \cdot 018 \times 2 = 0 \cdot 123$ sq. in.

Total area $= 0 \cdot 1348 + 0 \cdot 123 = 0 \cdot 2578$ sq. in.

The Moment of Inertia is best found by use of calculus.

If we take any rectangle (Fig. 4 (*a*)) of length l, breadth b, and distance d from a line xx

$$Ixx = lb\left(d^2 + \frac{b^2}{24}\right)$$

if $\frac{b}{d}$ is very small it will be sufficiently accurate to say $Ixx = lbd^2$.

Now take the arc AB (Fig. 4 (*b*)) of radius b and thickness t, t being very small in relation to the distance from xx. The inertia is required about xx. CD is an infinitesimally small portion of the arc and its distance from xx will be $a + b\cos\theta$ and its inertia about xx, $t(a + b\cos\theta)^2\, bd\,\theta$, *i.e.*, distance squared × length × thickness.

The inertia of the whole arc AB will therefore be:

$$t\int_{-\beta}^{\alpha} (a + b\cos\theta)^2\, bd\,\theta$$

$$= tb\int_{-\beta}^{\alpha} (a^2 + 2ab\cos\theta + b^2\cos^2\theta)\, d\theta$$

$$= tb\int_{-\beta}^{\alpha} \left(a^2 + \frac{b^2}{2} + 2ab\cos\theta + \frac{b^2}{2}\cos 2\theta\right) d\theta.$$

$$= tb\left[\left(a^2 + \frac{b^2}{2}\right)\theta + 2ab\sin\theta + \frac{b^2}{4}\sin 2\theta\right]_{-\beta}^{\alpha}$$

Using this method for our spar we have:—

$$\frac{\text{I flange}}{4t} = \int_{0}^{50} (1 \cdot 518 - 0 \cdot 15\cos\theta)^2\, 0 \cdot 15\, d\theta$$

$$+ \int_{-100}^{50} (1 \cdot 167 + 0 \cdot 4\cos\theta)^2\, 0 \cdot 4\, d\theta$$

$$+ \int_{0}^{100} (1 \cdot 08 - 0 \cdot 1\cos\theta)^2\, 0 \cdot 1 d\theta + 0 \cdot 18 \times 0 \cdot 981^2$$

$$= 0 \cdot 15\left[\left(1 \cdot 518^2 + \frac{0 \cdot 15^2}{2}\right)\frac{50}{57 \cdot 3} - 2 \times 1 \cdot 518 \times 0 \cdot 15 \times 0 \cdot 766 + \frac{0 \cdot 15^2}{4} \times 0 \cdot 985\right]$$

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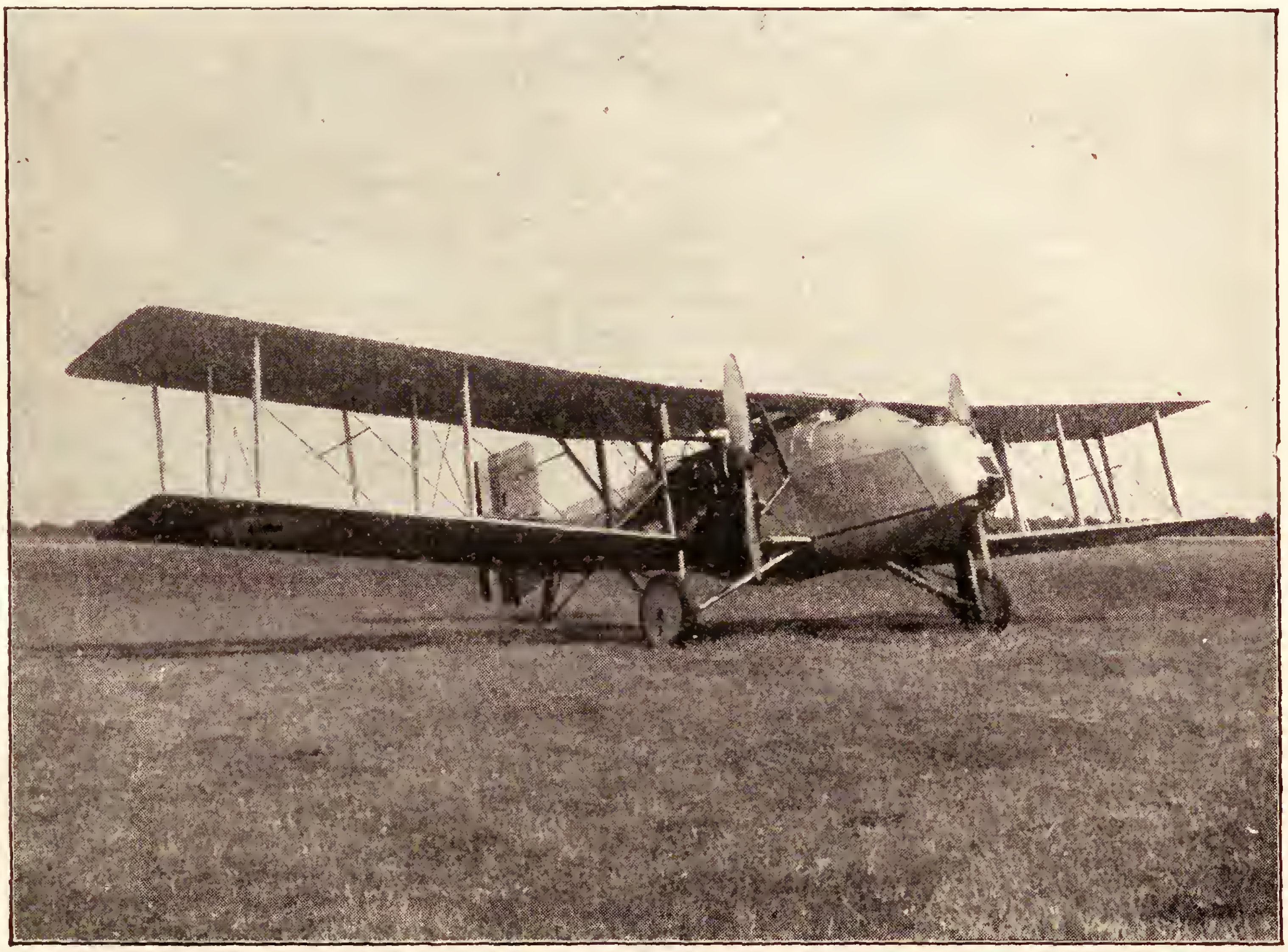

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$$+\ 0\cdot4\left[\left(1\cdot167^2+\frac{0\cdot4^2}{2}\right)\frac{150}{57\cdot3}+2\times1\cdot167\times0\cdot4\right.$$

$$\left.\times\,(0\cdot766+0\cdot985)+\frac{0\cdot4^2}{4}(0\cdot985-0\cdot342)\right]$$

$$+\ 0\cdot1\left[\left(1\cdot08^2+\frac{0\cdot1^2}{2}\right)\frac{100}{57\cdot3}-2\times1\cdot08\times0\cdot1\times0\cdot985\right.$$

$$\left.-\frac{0\cdot1^2}{4}\times0\cdot342\right]+0.18\times0\cdot981^2$$

$$=0\cdot251+2\cdot1755+0\cdot1837+0\cdot1735$$

$$=2\cdot7827$$

$$\text{I flange}=2\cdot7827\times4\times0\cdot22=\underline{0\cdot245\ \text{in.}^4}.$$

$$\frac{\text{I web}}{4t}=0\cdot1\times1\cdot057^2\times\pi+0\cdot961^2\times0\cdot18$$

$$+\int_0^{90}(0\cdot858+0\cdot1\cos\theta)^2\,0\cdot1\,d\theta$$

$$+\int_{0\cdot658}^{0\cdot858}x^2\,dx+\int_{20}^{90}(0\cdot658-0\cdot2\cos\theta)^2\,0\cdot2d\theta$$

$$+\int_0^{70}(0\cdot5\cos\theta)^2\,0\cdot5\,d\theta$$

$$=0\cdot35+0\cdot166+0\cdot1\left[\left(0\cdot858^2+\frac{0\cdot1^2}{2}\right)\frac{90}{57\cdot3}\right.$$

$$\left.+\ 2\times0\cdot858\times0\cdot1\times1\right]+\left[\frac{0\cdot858^3}{3}-\frac{0\cdot658^3}{3}\right]$$

$$+\ 0\cdot2\left[\left(0\cdot658^2+\frac{0\cdot2}{2}\right)\frac{70}{57\cdot3}-2\times0\cdot658\right.$$

$$\left.\times\,0\cdot2\,(1-0\cdot342)-\frac{0\cdot2^2}{4}\times0\cdot642\right]$$

$$+\ 0\cdot5\left[\frac{0\cdot5^2\times70}{2\times57\cdot3}+\frac{0\cdot5^2}{4}\times0\cdot643\right]$$

$$=0\cdot35+0\cdot166+\cdot134+0\cdot116+0\cdot075+0\cdot097$$

$$=0\cdot938$$

$$\text{I web}=0\cdot938\times4\times0\cdot018=\underline{0\cdot068\ \text{in.}^4}$$

$$\text{Total I of spar}=0\cdot245+0\cdot068$$

$$=\underline{0\cdot313\ \text{in.}^4}$$

By Webb and Thorne's formula for Max. Bending moment we have :—

$$\text{Euler Load Q}=\frac{\pi^2\,\text{EI}}{l^2}=\frac{\pi^2\times30\times10^6\times0\cdot313}{30\times30}$$

$$=\underline{102800}$$

$$\text{M (max)}=\frac{\text{Q}}{\text{Q}-\text{P}}\left\{\frac{1}{2}(\text{M}_\text{A}+\text{M}_\text{B})\left[1+0\cdot26\frac{\text{P}}{\text{Q}}\right]\right.$$

$$\left.+\ 1\cdot02\,\frac{wl^2}{8}\right\}+\tfrac{1}{2}\,\frac{(\text{M}_\text{A}-\text{M}_\text{B})^2}{wl^2}$$

$$=\frac{102800}{97800}\left\{0\cdot5\,(1900)\left(1+0\cdot26\times\frac{5000}{102800}\right)\right.$$

$$\left.+\ 1\cdot02\times\frac{120\times2\cdot5^2}{8}\right\}+\frac{0\cdot5\times(1100)^2}{120\times2\cdot5^2}$$

$$=\underline{1{,}918}\ \text{ft. lbs.}$$

$$f\,(\text{max.})=\frac{12\ \text{M}y}{\text{I}}+\frac{\text{P}}{\text{A}}=\frac{12\times1{,}918\times1\cdot575}{0\cdot313}+\frac{5{,}000}{0\cdot2578}$$

$$=115700+19400$$

$$=135100\ \text{lbs./sq. inch.}$$

Therefore, this spar will be O.K. in DTD 16/50 steel. We will now get out the rolls or dies for making the sections out of flat sheet. These must be made very accurately, for if the strip is gripped tighter in one place than another it will come out twisted.

The first rolls are got out by sight from experience; the last but one is generally made of similar dimensions to the finished section and the last has to be such that the spring back will give the correct section, and is arrived at in the following manner:

We know that $\frac{\text{E}}{\text{R}}=\frac{f}{y}$.

If we denote the finished section constants by $\text{E}_1\,\text{R}_1 f_1$ and y_1 and those of the section in the last die by $\text{E}_2\,\text{R}_2\,f_2$ and y_2 we get $\frac{\text{E}_2}{\text{R}_2}-\frac{\text{E}_1}{\text{R}_1}=\frac{f_2}{y_2}-\frac{f_1}{y_1}$, but $f_1=0$, as there is no stress in the metal after spring back and $f_2=$ yield stress, as the material yields in the die to give it its new curvature. This is not the yield stress from specification, but from test of material used, and is about 70 tons/sq. inch in DTD 16/50.

$$\text{E}_1=\text{E}_2\ \text{and}\ y_1=y_2.$$

We can therefore write $\text{E}\left(\frac{1}{\text{R}_2}-\frac{1}{\text{R}_1}\right)=\frac{f_2}{y}$

and $\frac{1}{\text{R}_2}-\frac{1}{\text{R}_1}=\frac{f_2}{\text{E}y}$.

We will work out the last die for the flange. Let us denote the arc of ·15″ radius by 'a,' ·4 by 'b,' and ·1 by 'c'

then $\frac{1}{\text{R}a}=\frac{70}{13{,}600\times0\cdot011}+\frac{1}{0\cdot15}=\frac{1}{2\cdot137}+\frac{1}{0\cdot15}=\frac{1}{0\cdot1395}$

$$\frac{1}{\text{R}b}=\frac{1}{2\cdot137}+\frac{1}{0\cdot4}=\frac{1}{0\cdot3365}$$

$$\frac{1}{\text{R}c}=\frac{1}{2\cdot137}+\frac{1}{0\cdot1}=\frac{1}{0\cdot0957}.$$

This gives our radii for the last die as ·1395″, ·3365″ and ·0957″ respectively. Now the length of arc of each separate curve must remain the same for all the rolls and dies.

Therefore the new angles will be

$$(a)\quad\frac{0\cdot15\times50}{0\cdot1395}=53\cdot7°.$$

$$(b)\quad\frac{0\cdot4\times150}{0\cdot3365}=178\cdot7°.$$

$$(c)\quad\frac{0\cdot1\times100}{0\cdot0957}=104\cdot3°.$$

Fig. 5 shows the rolls and dies. The first two may be rolls but the last two must be dies; the distance x being less than y the rolls could not run in each other. No. 3 could be made suitable for rolls by cutting away the small portion that fouls. This being so small would not harm the strip.

The axes of the male and female rolls should be equidistant from the centre of the strip $x - x$; this minimises the amount of slip caused by the difference in linear velocity of the rolls, which increased with their difference of diameter at any point.

The rolls for the webs may be found in the same way; it will be better to have five instead of four for this section.

Some firms have fitted a furnace to their drawbench and they draw the metal hot.

I have no experience of results, but would imagine that the dies would be difficult to design, the yield point being an unknown quantity. Against this method is the very much greater time taken. With good tools and a little experience, good results should be got from drawing cold. Twist is often due to badly made dies or drawing through two at once that are not in line.

It is better to have the rolls sliding on a splined shaft; if they are fixed it is very difficult to get three or four dead in line. Always have a lead in on the dies. Make, say, ¼ in. of the die the true section and chamfer the rest off.

A test should be made of all new spars to see that they develop the required stress without local buckle.

The Editor will be pleased to receive for consideration articles dealing with constructional and designing problems. All articles accepted will be paid for at our usual rates.

AN INTERESTING UNDERCARRIAGE "LEG."

New Features of Beardmore Chassis.

Descriptive articles are, generally speaking, outside the scope of THE AIRCRAFT ENGINEER, unless they happen to be of a more technical character than is normally the case with articles of this kind, when an exception may be made at the discretion of the Editor. Such an exception is found in the following article on the new undercarriage "leg" designed and patented by Wm. Beardmore & Co. and Mr. W. S. Shackleton, their chief aircraft designer. Although a proprietary article, this "leg" should be of interest to all aircraft designers, as it incorporates certain new and interesting features, and since, if desired, arrangements could presumably be made with the patentees for fitting it on machines of other makes. The description which follows has been prepared by the Beardmore firm, to whom also we are indebted for the illustrations accompanying the article.—ED.

A general idea of the mounting of this device as applied to the Beardmore W.B. XXVI 2-seater fighter aeroplane is given in Fig. 1, and a diagram of the internal mechanism is shown in Fig. 2.

The leg consists essentially of two telescopic elements, provided with universal joints at the ends for fixing between a pivoted form of axle and some suitable point on the fuselage or wing, it being immaterial which end is considered as the moving one. The end fittings are of a special knuckle type in preference to ball ends, which latter are liable to be broken or strained unless care is exercised in dismantling and assembly.

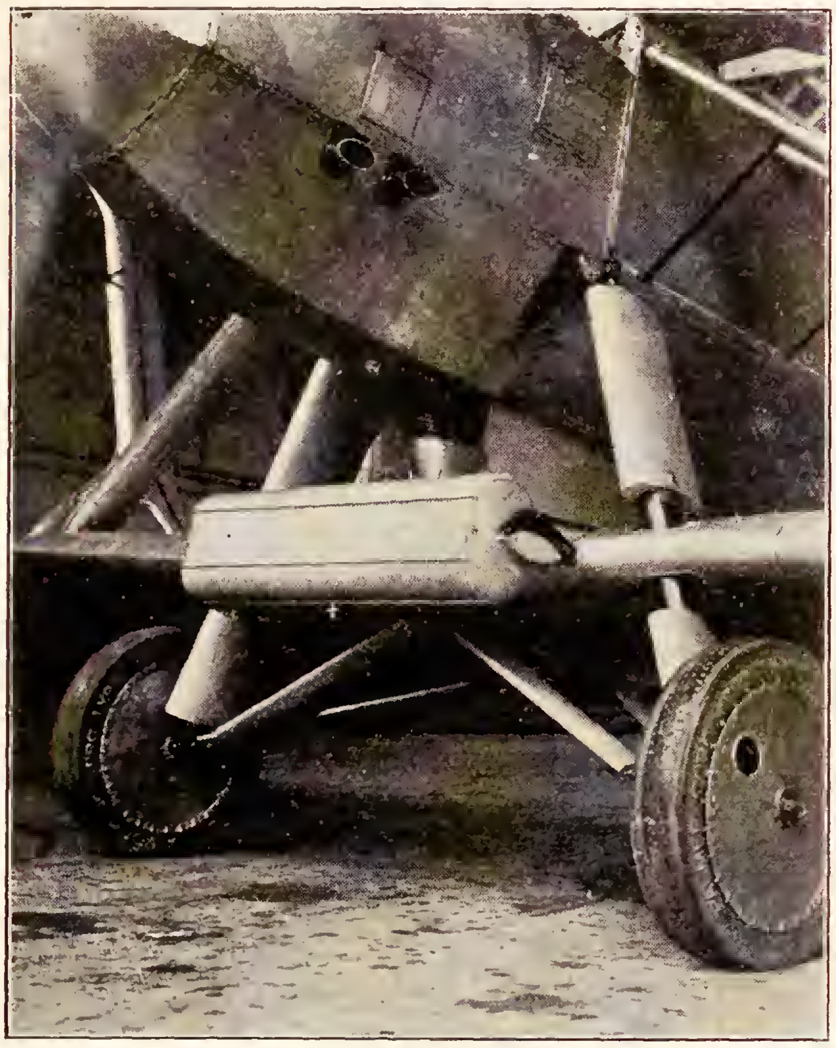

Fig. 1. Undercarriage of the Beardmore W.B. XXVI two-seater fighter, illustrating the general arrangement of the "Legs" shown in section in Fig. 2.

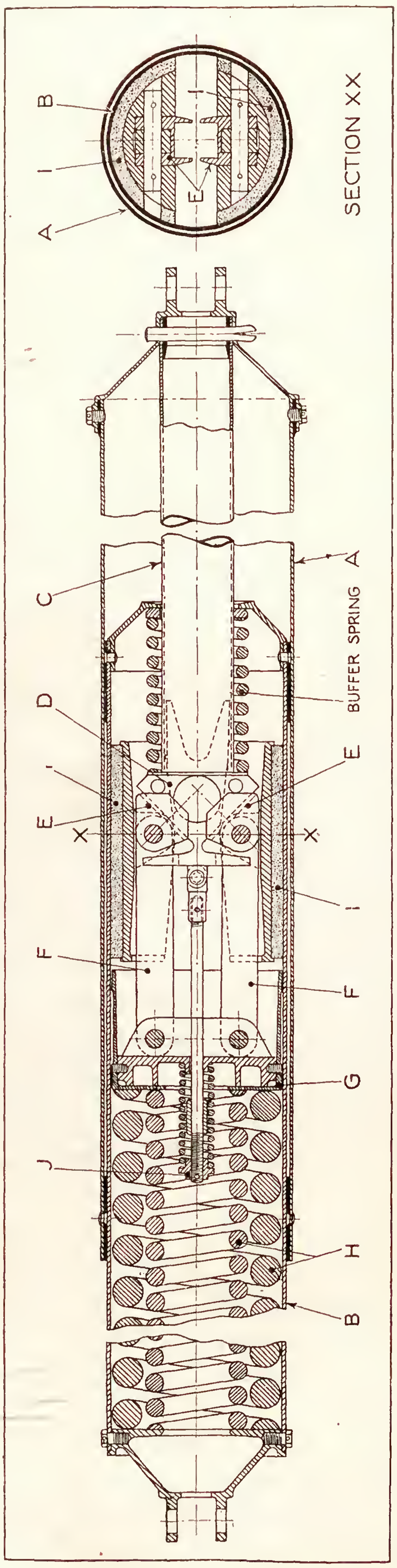

Fig. 2. Sectional drawings of the Beardmore-Shackleton undercarriage "Leg," in which Ferodo friction blocks are used for damping. In the drawing A is the outer and B the inner telescopic tube. The loads are taken directly through tube C, wedge D, slippers E, connecting Rods F, and piston G to the concentric coil springs H. The Ferodo-faced fric'ion shoes I are forced against the walls of tube B by the wedge D.

In Fig. 2, tube A is arranged to slide freely over tube B. On compressing the leg, the loads are taken directly through tube C, wedge D, slippers E, connecting rods F, and piston G to one or more helical coil springs H. Ferodo-faced friction shoes I are forced against the internal walls of tube B by the wedge D, and as the leg is compressed exert a braking or damping action. The radial force applied on each shoe is at all times proportionate to the force exerted by the springs and to the angle of the wedge. The braking force, or drag, is proportionate to the total pressure on both shoes, multiplied by the coefficient of friction of the surfaces in contact, and is practically independent of the actual surface in contact. It follows, therefore, that the braking force is at all times a direct function of the load exerted by the springs.

The deflection of a helical coil compression spring is directly proportionate to the torsional modulus of elasticity, and to the applied load, and can be calculated with a close degree of accuracy. The deflection plotted against the applied load can therefore be represented by a straight line. A very useful and convenient feature of the helical coil compression spring is that the closing of the coils tightly against each other can be arranged to prevent over-stress in the spring. The pitch of the coils in the Beardmore landing gear has been so arranged that the maximum allowable stress is developed when the spring is solidly compressed. Two alleged defects inherent in springs of any type for aeroplane under-carriage work are: (1) that, whilst they absorb energy, they actually dissipate energy to only a relatively small extent, due to the low hysteresis factor, and (2) that the weight is excessive.

The first point does not arise in the Beardmore undercarriage, as any required proportion of energy can be dissipated through the Ferodo brakes. The weight is not excessive, provided the springs are designed to work at the high maximum stresses which can safely be obtained with modern steels. The chrome-vanadium steel springs used on the Beardmore undercarriage permit of a safe torsional shear stress in excess of 60 tons per square inch, which is about twice the usual allowed on springs of ordinary carbon steel. The use of alloy steel for springs does not alter the deflection of a spring under a given load to any appreciable extent. It merely allows a greater ratio of solid to free length. Therefore, in the case of two springs of identical dimensions, but made from high and low tensile steels respectively, a given deflection would require the same static load in both cases. The pitch of the coils, however, on the alloy steel spring would, in practice, be made greater so as to develop the higher stress when fully closed, resulting in greater range of movement, greater carrying capacity, and lower weight.

The weight of the complete undercarriage for the machine illustrated in Fig. 1, inclusive of wheels, tyres, fairings, etc., is only a little over 4 per cent. of the total all-up flying weight. This compares favourably with any other type of landing gear having a similar range of travel.

Further weight could be saved if hollow springs were a commercial proposition, but the difficulties involved in their production appear to be very great. Square section springs are not so suitable for this class of work, and are likely to work out heavier in practice than springs made from solid round stock. As a coil spring is stressed in torsion, the load-carrying capacity varies in a similar manner to the polar section modulus, and for torsion a square section is not so economical as a round one. Further, the stress distribution is higher in the corners of the square, which is liable to produce cracks and subsequent fracture.

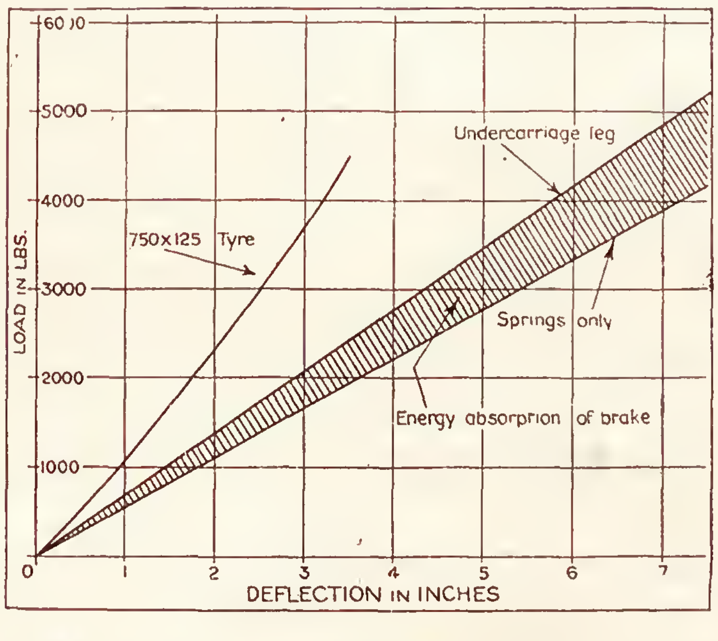

Fig. 3. Representative Load/Deflection Curve of Beardmore undercarriage. It should be pointed out that a deflection of 7½ inches on the undercarriage "Leg" corresponds to a movement of 11 inches on the wheel.

A practical point worth knowing when two or more concentric springs are working together is to arrange the winding of adjacent springs in opposite directions so as to prevent interlocking.

Spring steels are now available with yield points in excess of 100 tons per sq. in. A representative composition and physical properties of a steel specially developed for use on the Beardmore landing gear by the Clyde Alloy Steel Co. is given herewith :—

Analysis.

	Per cent.
Carbon	0·42
Silicon	0·22
Manganese	0·82
Chromium	1·13
Vanadium	0·12
Sulphur	0·028
Phosphorus	0·026

Physical Tests.

Yield	102·1 tons.
Ultimate stress	112·4 ,,
Elongation on 2 in.	12·0 per cent.
Reduction of area...	43·4 ,,

The torsional modulus of elasticity can be taken as 12,500,000. Actual tests have shown that the coefficient of friction of Ferodo against steel, with the surfaces slightly lubricated, is of the order of 0·24 to 0·28. It has been proved that, with a mean rubbing pressure of 60 lbs. per sq. in. on the projected area of the shoes, practically unlimited life can be expected of the brake mechanism. In this connection it is well known that Ferodo material will stand up successfully for years in automobile brakes, where the conditions are very much more severe.

Automobile brakes are designed to absorb the kinetic energy resulting from the forward velocity of the vehicle, and as the kinetic energy varies as the square of the speed, this can have a very considerable value. For example, in the case of an automobile of 2 tons weight travelling at 60 m.p.h., the kinetic energy is equal to 540,000 ft./lbs.

In the particular application under review it is only the energy resulting from vertical velocities which has to be considered. On the Continent a vertical velocity of 3 m. per sec., and in this country 10 ft. per sec., are usually taken as the maximum values which need be considered. The length of stroke and shock absorption qualities are then so arranged that a definite load factor value is not exceeded.

Taking an aeroplane of 2 tons weight with 10 ft. per sec. vertical velocity, the kinetic energy is only 6,970 ft./lbs. and as a large proportion of this energy is absorbed in the tyre, springs and other parts, it is obvious that the Ferodo in this particular application is called upon to do relatively little, and that almost unlimited service can be expected of the brake elements. Energy is dissipated on both strokes. On completion of the landing stroke the energy stored in the springs is released as the leg extends to normal length. It follows that the forces exerted by the springs on the return stroke produce drag forces of corresponding amount in the brake elements, resulting in further dissipation of energy. The correct damping of the return stroke is important if bouncing is to be avoided.

With the present mechanism, any required ratio of spring force to brake force can be obtained by varying the angle of the wedge D.

A further constant brake resistance can be superimposed by suitable adjustment of the nut J. Practice has shown that the machine can be taxied or landed on extremely rough ground without there being any tendency to bounce. The springs are fitted without any initial compression. This facilitates assembly and at the same time ensures a considerable deflection under unit load. The legs are, therefore, not extended to full length until the machine leaves the ground, which arrangement gives increased travel and provides for considerable energy absorption before the undercarriage again reaches unit load.

Many tests were made to find the range of movement in service, and strangely enough the greatest deflections have been recorded in high-speed taxying over rough ground. Landings, made purposely severe, on the same ground have not produced so great a deflection.

Fig. 3 shows a representative load/deflection curve for an undercarriage suitable for a machine having a total all-up weight of about 3,200 lbs. The total work of compression for the two legs is equal to 3,250 ft./lbs., which figure is ample when allowance is made for the energy absorption of the tyres and the strain energy present in the axles and struts under load.

STALLED FLIGHT AND CONTROL.

The Practical Aspect.

By FRANK T. COURTNEY.

The fundamental factor in the question of the safety or otherwise of an aeroplane is the stall. The vast majority of aeroplane accidents, including landing accidents, can be directly attributed, in some way or another, to stalling. It follows, therefore, that the study of stalling is not merely the study of one of the very many interesting problems of aviation; it goes right to the root of aviation. Consequently, it is a matter on which the most accurate conclusions should be drawn. In my humble opinion the great amount of talking, writing and experiment that has been done recently on this subject has been done from a hopelessly unpractical standpoint, is very largely inaccurate, and is directly harmful as well as wasteful.

I have for a very long time closely studied this question, and I give here, for what they may be worth, my practical conclusions on the matter.

In the first place, what is the stall? The lift on a cambered aerofoil is due to a phenomenon of air flow around the cambered surface, which has little or no resemblance to the lift that would be given by the vertical component of the air pressure on an inclined flat plate. When the cambered surface exceeds a certain angle of incidence (which, in actual practice, corresponds generally to a certain minimum or "stalling" speed), this flow quite suddenly breaks down.

It is true, in theory, *that this does not mean the complete loss of lift, since that form of lift is replaced by a much lower degree of lift, corresponding to the flat-plate lift. But*, in practice, *and in any normal reasonable aeroplane, this loss of lift is so great and so sudden as to amount to the complete loss of all lift on the wings. Moreover, even if the remaining lift is taken into account, it is accompanied by so high a drag that the corresponding gliding angle is steep enough to correspond with the dive of a liftless aeroplane.*

The forces then are too low to provide any useful parachute effect, so that I adhere to my contention that, for all practical purposes, the stalling of an aeroplane corresponds to complete loss of lift.

This is where, in my view, recent research in the matter has parted company with practical politics, since it has concerned itself with the pointless problem of "What shall we do when we have stalled?" It has spent much time and money on the useless study of stalled flight, and incidentally evolved a useless mechanism to deal with it, which is based on arguments as plausible as they are inaccurate.

Before dealing with the arguments of the Aeronautical Research Committee, I should point out that the theoretical and aerodynamical facts concerned with stalling are reasonably simple and accurately known. The rest, therefore, is purely a flying problem, so that the flyer who has closely examined the facts as they occur is not in too weak a position to dispute with the scientists.

The arguments on which the Aeronautical Research Committee have based their conclusions are approximately as follows:—

(1) It is admitted that the vast majority of aeroplane accidents are due to stalling near the ground, and this occurs when a pilot in difficulties near the ground, accidentally stalls his machine in trying to extricate himself from the difficulty.

(2) Such stalling being almost invariably accompanied by the dropping of one wing or the other preparatory to spinning, the use of the ordinary aileron for raising this wing is applied. This, after stalling, has very little effect for raising the wing, but assists the spinning tendency owing to aileron drag.

(3) If an aileron were to be designed so as to maintain powerful lateral control, the pilot, though stalled, would be able to raise that wing, thus avoiding a spin, so that—

(4) The machine would then drop horizontally into the ground with less serious harm to its occupants than if it had spun (which at a low height generally means dived) into the ground.

At first sight these arguments seem very reasonable. A closer study shows, however, that they not only have little or nothing to do with the real circumstances involved, but are even technically inaccurate.

Let us take argument No. 1. The whole fallacy of this rests in the idea that the pilot *accidentally* stalls. He doesn't. The vast majority of stalling accidents are due to the *deliberate* attempt of the pilot to hold the machine in the air—to reach a field, to clear a tree, or what not—for a greater distance or period than is physically possible for the machine. He does not, of course, deliberately stall, but he does deliberately carry out those actions leading to the stall, and the mental attitude which makes him try and hold the machine up in defiance of his air-speed is really a subconscious defiance of the stall. Thus the arguments of the Aeronautical Research Committee have already broken down, since the problem has already almost ceased to be a mechanical one and has become a psychological one. The state of mind of the pilot immediately preceding such a crash is one of a greater or less degree of mental panic. Hence I might say in passing that I am convinced that those anti-stalling devices which give the pilot a warning forward kick on the control would in practice probably be worse than useless. For if a pilot's stick were kicked forward at the moment when his governing idea is to keep out of the ground he would pull it back still harder.

Argument No. 2 similarly leaves out most of the practical factors. In the first place, after stalling the impression given to the pilot by the dropping wing is really that of the nose diving away in a sideways direction. His governing idea, then, is to get the nose up, with such aileron control as he may manage to use when the stick is hard back. I have watched many such crashes, and have only once noticed any large amount of aileron movement. I consider that there is no question that a pilot who has let himself get into those circumstances has no other idea than "stick back." The ailerons, then, whether he uses them or not, have little to do with the main fact that the wings have lost their effective lift, the nose drops, and whether the wing drops or does not drop has no importance for the ailerons. For if the pilot had sufficient reason left to use his ailerons he would also use corresponding rudder, which, under the circumstances, would be a far more effective control.

If a pilot under those crash conditions cannot raise his wing, he dives into the ground somewhat sideways. If he does raise his wing he still dives into the ground forwards.

For, as regards argument No. 4, there can be nothing whatever to show that, even if under complete control, a stalled glide will differ much from a dive. Moreover, it has the additional disadvantage that, whilst a dive is something on the way to normal flight, a stalled glide under control would tend to remain a stalled glide, for, in any attempt to regain normal flight, the pilot would have to put himself through the dive stage. Nor would the machine maintain anything like a horizontal attitude fore-and-aft, unless an elevator control of preposterous dimensions were employed, or all normal stability systems upset.

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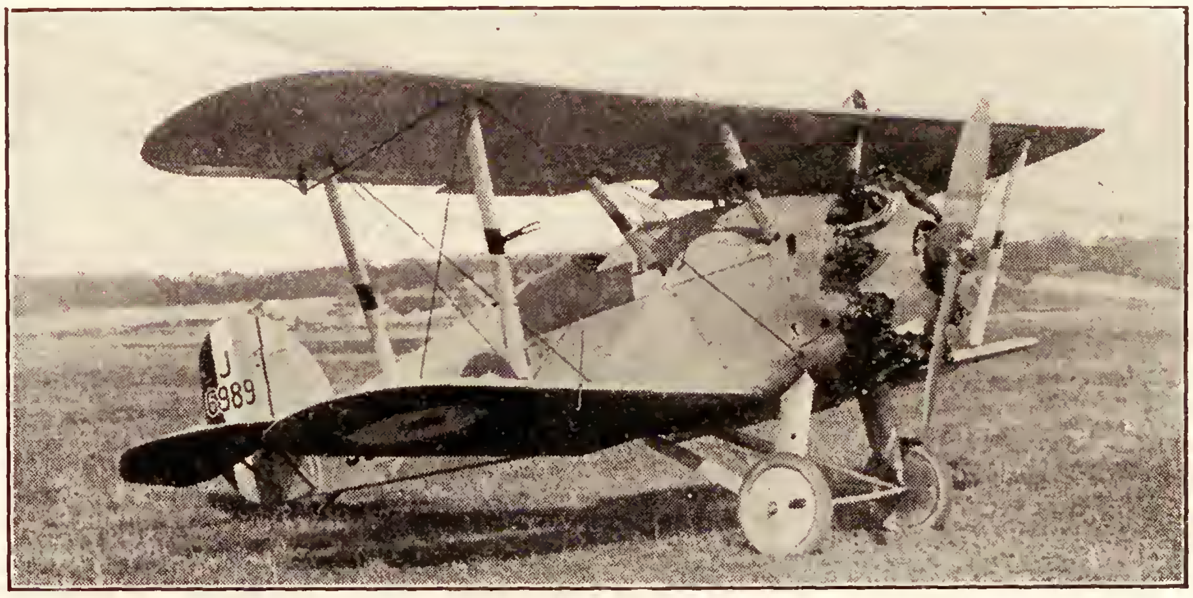

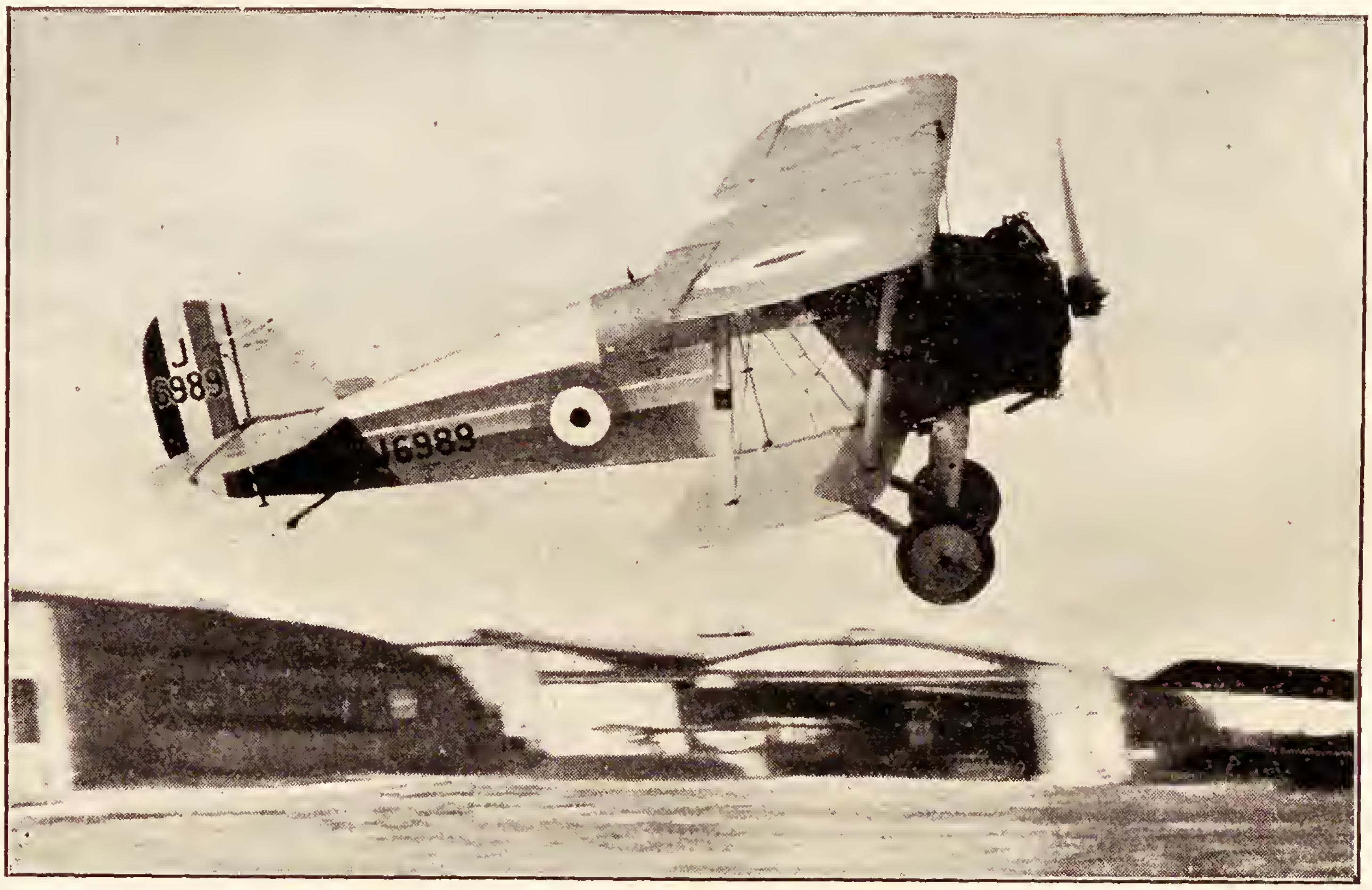

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The Aeronautical Research Committee have, however, put their money on the Slot-cum-Aileron lateral control as a useful means of preventing the worst effects of the stalled crash.

I have tried this gadget, and my impression is that, firstly, it does not do what is claimed for it, and, secondly, as my remarks above are intended to show, it would be of no use if it did.

It is true that, beyond the stall, this control provides a powerful rolling effect, so powerful as to throw the machine over the other way if hastily used. It also has a very powerful positive yawing effect, which, I understand, was one of the things it was particularly designed to avoid. On the machine to which this gadget is fitted for test—a standard Avro—it is true that during the use of the aileron the nose tends to come up, but this is Avro, and has nothing to do with control.

So far as this control may claim to raise the nose of the machine, it is true that the use of the slot on one side provides an addition to the total lift. This, however, has nothing to do with the control aspect of the matter. The whole stall could be avoided by the use of a complete slotted wing system, which, however, is apparently not proposed.

The mechanism is obviously heavy and expensive, and would undoubtedly be difficult to maintain in truth. It would not apply, probably, more than once in fifty thousand flights, and when it did it would be at the best of very doubtful value. Hence it seems difficult to understand that the control should have been recommended seriously to aircraft constructors as a means of achieving some useful object. As a help for stalling crashes, it seems about as useful as handing a cup of hot tea to a drowning man because the water happens to be cold.

The sponsors of this strange and elaborate gubbins do not seem to have noticed that a powerful rudder control will do the same thing, but will do it rather better. For example, if a stalled machine starts a spinning motion to the left, the application of a powerful rudder control to the right will stop the spin, will check the yaw, will bring the machine to a laterally-horizontal position, *and*, owing to the downward movement of the tail unit, to a temporarily horizontal position fore and aft. The stunt known as the "falling leaf" is an excellent example of this, since it reproduces many times consecutively the actual conditions in question; rudder alone is used in alternate directions under the "stick back" condition.

Having dealt at painful length with destructive criticism what about something constructive?

The stall being (until the advent of the Autogiro) an indelible feature of the aeroplane, must be dealt with as it is in working practice. I suggest that the practical way of ameliorating the dangerous conditions of the stall is two-fold:

(1) Making the stalled-crash subject a definite and important part of flying instruction:

(2) Providing powerful control *right down to* stalling speed.

The only point on this subject on which the scientists are nearly right is that a pilot in difficulties may easily *instinctively* do the wrong thing.

Only, as a matter of fact, it is not *instinctive*—though the word is good enough—it is purely a matter of training. For example again, a pilot with an engine failure tries to reach a field the machine cannot reach, or to clear a tree that it cannot clear. His training—or instinct—is that if you pull the stick back you go up. He knows perfectly well, subconsciously, that he cannot reach the field, but another part of his brain, reacting to that training, pulls that stick back. This is most decidedly the state of affairs governing the stalled crash, and, regarded as such, is most definitely easy to deal with in training.

If the trouble is "instinctive," the cure must also be "instinctive," and my own instructional methods used to be to try and instil a definite and separate emergency instinct into the pupil. This instinct, being mainly based on the necessity of avoiding stalling, can be formed on a sort of Coué idea of "When in trouble, bang your stick up against the dashboard, and think afterwards." By making a habit of switching off the engine (during dual instruction) at all sorts of unexpected moments, I found it very easy to induce pupils to push the nose hard down, *without thinking*, in the most unfavourable of situations. It is an almost infallible method of instilling the avoidance of the stall into a pupil, and though the violent push on the stick that I used to insist on became modified to a more reasonable push, the "instinct" for maintaining flying speed definitely overcame the "instinct" to hold the nose up. As I claimed at the start, the stalled crash is almost entirely psychological, and must be cured psychologically.

On the mechanical side I claim definitely that control beyond the stall as a serious study is of greatly exaggerated importance. But, control *right down to* the stall has more importance than might appear. For supposing, as frequently happens, control becomes feeble some ten miles an hour before the stall, then, if the pilot wishes, to glide at his very lowest speed he definitely risks passing stalling speed for lack of control. Further, should he then get into some of that panic state which inevitably means the "stick back" policy, this will be increased by the knowledge that, if he does push the stick forward, he must not only come unstalled, but must gain a further 10 m.p.h. before he has full control.

If, on the other hand, full control exists down to the stall, a mere forward flick on the stick restores both normal flight and full control.

The perfect, or nearly perfect, low speed control is a fairly simple matter, yet it seems to have had very little practical examination. The result is that the two most popular forms of lateral control at the moment are ones in which the main principles militate against perfect low speed control.

But in any case, the stall provides fundamental difficulties, not to be cured by any such methods as a clumsy lateral control, whose principles only operate on rare occasions.

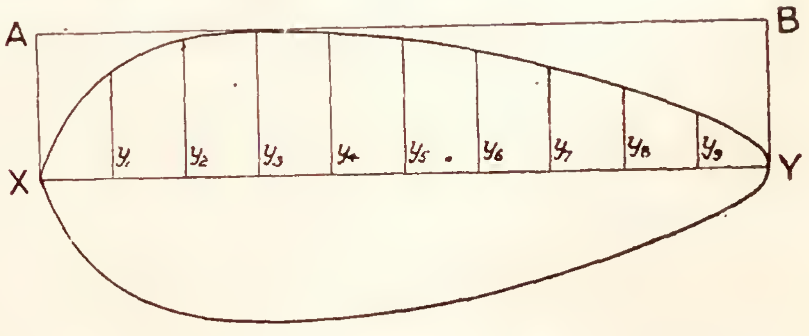
IN THE DRAWING OFFICE.

STREAM-LINE STRUTS.

Areas and Moments of Inertia.

By Lieut.-Col. J. D. Blyth, late R.A.F.

In the process of calculating the dimensions of a stream-line strut to take a given load, it becomes necessary to find the area and the least moment of inertia of its cross-section. Doubtless designers and draughtsmen have their own abbreviated ways of so doing; but the great majority of those whose experience of aeroplane design is small, and whose interest in the subject is growing, have to adopt the various methods given in text books, most of which are somewhat laborious. A method of considerably simplifying the work and of obtaining the required results from one set of measurements may be of interest to the latter.



Given the shape of the cross-section as in the figure, draw the longer axis XY, and complete the rectangle XABY so that AB is a tangent to the curve.

Then l = XY = length of section.

t = 2AX = thickness of section.

$\frac{l}{t}$ = F = fineness ratio.

Since the section is symmetrical about XY, XY is the neutral axis.

Now divide XY into 10 equal parts, and draw the ordinates $y_1, y_2, y_3 \ldots y_9$. Measure the lengths of these ordinates.

By making use of Simpson's First Rule, we can now find all we require.

A = area of section.
I = least moment of inertia of section.
k = corresponding radius of gyration.

$$\tfrac{1}{2}\text{A} = \frac{l}{30}\left\{4\,(y_1 + y_3 + y_5 + y_7 + y_9) + 2\,(y_2 + y_4 + y_6 + y_8)\right\}$$

$$\tfrac{1}{2}\text{I} = \frac{l}{30}\left\{4\,(y_1^3 + y_3^3 + y_5^3 + y_7^3 + y_9^3) + 2\,(y_2^3 + y_4^3 + y_6^3 + y_8^3)\right\}$$

$$k = \sqrt{\frac{\text{I}}{\text{A}}}$$

If required, the greatest moment of inertia may be found in the same way. In this case, the neutral axis is drawn perpendicular to XY through the centre of area of the section. This lies on XY, its distance from the nose X being $\bar{x}$, where

$$\bar{x} = \frac{l}{10}\left\{\frac{4\,(y_1 + 3y_3 + 5y_5 + 7y_7 + 9y_9) + 2\,(2y_2 + 4y_4 + 6y_6 + 8y_8)}{4\,(y^1 + y_3 + y_5 + y_7 + y_9) + 2\,(y_2 + y_4 + y_6 + y_8)}\right\}$$

To some, at first sight, these expressions may appear a little cumbersome, but the cubes can be looked up in a table, and the rest involves no higher mathematics than a little addition, multiplication, and division.

For standard stream-line struts these expressions may be further simplified, as for any particular thickness of strut, the values of y_1, y_2, y_3, etc., remain the same for every fineness ratio.

Giving the symbols l, t, F, A, I, k, and $\bar{x}$ the same meanings as before :—

$$l = \text{F}t$$

For standard stream-line struts :—

$y_1 = 0{\cdot}375t$
$y_2 = 0{\cdot}475t$
$y_3 = 0{\cdot}5t$
$y_4 = 0{\cdot}49t$
$y_5 = 0{\cdot}47t$
$y_6 = 0{\cdot}425t$
$y_7 = 0{\cdot}365t$
$y_8 = 0{\cdot}275t$
$y_9 = 0{\cdot}19t$

The tail is rounded off, the radius being $0{\cdot}1t$. We now get :—

$\text{A} = 0{\cdot}725\text{F}t^2$
$\text{I} = 0{\cdot}044\text{F}t^4$
$k = 0{\cdot}246t$
$\bar{x} = 0{\cdot}449\text{F}t$

If these values are plotted for a number of values of t, and such values of F as are being used, the required dimensions of a section for any value of A, I, or k can be read off at once.

TECHNICAL LITERATURE.

A.R.C. REPORTS.

INTERNATIONAL TRIALS. REPORT ON AEROFOIL TESTS AT NATIONAL PHYSICAL LABORATORY AND ROYAL AIRCRAFT ESTABLISHMENT. R. & M. No. 954 (Ae. 173). (46 pages and 7 diagrams.) May, 1925. Price 2*s.* net.

Acting on a suggestion made by the Director of Research, the Aeronautical Research Committee decided in March, 1920, to institute comparative model tests in as many as possible of the aerodynamic laboratories of the world. It was thought that such tests, in which the same models would be tested successively by all laboratories, would supply valuable information which had not previously been available. The aim of wind-tunnel experimental work is to obtain reliable estimates of the forces which would be experienced by bodies moving at specified speeds through still air of infinite extent; but in practice it is necessary to hold the model stationary and to generate a flow of air past it, and measurements made in this way are in some degree open to question, in that the forces imposed upon the model may be affected (1) by the limited extent of the air stream in which they are placed and (2) by the turbulence which can never be entirely eliminated. The results must, furthermore, depend to some extent upon the methods adopted for connecting the models to the measuring apparatus. Different methods are adopted in different countries, and wind tunnels of varying size and design are employed; thus there is some uncertainty as to the extent to which a comparison can be made, *e.g.*, between different aerofoils tested in different countries, and this uncertainty, it was thought, would be reduced if comparative figures were available from tests upon the same models.

The tests finally decided upon included the determination of lift, drag, and C.P. for a standard aerofoil model of R.A.F. 15 section at various angles of incidence. The tests carried out in Great Britain are reported in the present paper (R. & M. 954), and the results plotted in the appended figures. The results should be of general interest to all establishments or firms which use wind tunnels for making experiments on aerodynamic models, and they show the amount of variability that is obtained between the results on the same model tested under a variety of conditions. In general, the agreement between the N.P.L. and the R.A.E. wind tunnels may be considered satisfactory with the exception of one of the N.P.L. wind tunnels, namely, the 7-ft. No. 1. It is further to be noted that the results on the 4-ft. tunnels, when corrected for tunnel-wall interference by the Prandtl theory, are in very good agreement with the 7-ft. tunnel results except in the case of the N.P.L. 4-ft. No. 2 tunnel.

THE LATERAL CONTROL OF STALLED AEROPLANES. GENERAL REPORT BY THE STABILITY AND CONTROL PANEL. R. & M. No. 1000. September, 1925, 2*s.* net.

The problem of obtaining adequate lateral control of aeroplanes has occupied the attention of research workers and designers for a number of years and it is now certain that the problem is sufficiently understood to permit of a satisfactory solution in the case of the normal design of aeroplane as it is known to-day.

The existing form of lateral control is the aileron, which introduces a moment tending to turn as well as to bank the aeroplane, and some device has long been needed which would give the required rolling moment without the accompanying yawing or turning moment. The most satisfactory means yet devised for obtaining this type of control is the slot-and-aileron described in R. & M. Nos. 916 and 968. Smaller improvements in other directions have resulted with the use of increased rudder control, the full-scale tests of which are described in R. & M. No. 972, and by the use of differential ailerons as described in R. & M. No. 964.

The present report commences with a general statement of the problem of the lateral control of stalled aeroplanes, and outlines the general principles of satisfactory control. The data required and the methods of analysing the data obtained from models are next discussed in some detail, and an account is given of certain step-by-step calculations made for the motions following from certain initial disturbances. The various devices tried for the improvement of lateral control are also described in some detail, and complete references are given to the whole of the work bearing on the investigation.

The object of the Aeronautical Research Committee in initiating the experiments here discussed has been to reach a thorough understanding of the principles governing control of stalled aircraft in any circumstances, and to lay the foundations of precise information upon which can be built up routine methods of predicting, from an inspection of the design, the degree of controllability to be expected in any aeroplane. It is considered that the first of these objectives has, in a measure, been attained, but the second has not and cannot be attained except as the result of laborious and lengthy experiments, which have yet to be undertaken.

The fore-and-aft control of stalled aeroplanes yet remains to be studied in detail. This it is proposed to do as soon as possible. From practical experience there is no doubt that the conventional aeroplane of the present day can be controlled fore-and-aft when stalled to moderate angles, but considerably more study of the problem is required before it will be practicable to experiment on the problem of landing whilst in the stalled state.

These Reports can be obtained from H.M. Stationery Office, Kingsway, W.C. 2, and from Branch Offices.

AMERICAN NATIONAL ADVISORY COMMITTEE REPORTS.

Report No. 214, by Professor E. P. Warner, of the Massachusetts Institute of Technology, is entitled "Wing Spar Stress Charts and Wing Truss Proportions." In the introduction it is pointed out that, although the coming of the thick aerofoil section has somewhat decreased the number of aeroplanes designed with continuous wing spars externally supported at several points, the type has not by any means disappeared, and the calculation of continuous beams is still making heavy inroads upon the time of the designer. The curves given and described in this report have been prepared with the object of reducing the labour involved in such calculations. A series of charts have been calculated, giving the bending moments at all critical points, and the reactions at all supports for such members. Using these charts as a basis, calculations of equivalent bending moments, representing the total stresses acting in two-bay wing trusses of proportions varying over a wide range, have been determined, both with and without allowance for column effect. This leads finally to the determination of the best proportions for any particular truss or the best strut locations in any particular machine. The ideal proportions are found to vary with the thickness of the wing section used, the aspect ratio and the ratio of gap to chord.

Report No. 217, by Dr. Max Munk, is entitled "Preliminary Wing Model Tests in the Variable Density Wind Tunnel of the N.A.C.A.," and contains the results of a series of tests with three wing models. By changing the section of one of the models and painting the surface of another, the number of models tested was increased to five. The tests were made in order to obtain some general information on the air forces on wing sections at a high Reynolds Number, and in particular to make sure that the Reynolds Number is really the important factor, and not other things like the roughness of the surface and the sharpness of the trailing edge. The tests described seem to indicate that the air forces at a high Reynolds Number are not equivalent to respective air forces at a low Reynolds Number (as in an ordinary atmospheric wind tunnel). The drag appears smaller at a high Reynolds Number, and the maximum lift is increased in some cases. The roughness of the surface and the sharpness of the trailing edge do not materially change the results, so that it is felt that tests with systematic series of different wing sections will bring consistent results, important and highly useful for the designer.

Copies of these reports can be obtained from the Superintendent of Documents, Government Printing Office, Washington, D.C., U.S.A.

VERSLAGEN EN VERHANDELINGEN VAN DEN RIJKS-STUDIEDIENST VOOR DE LUCHTVAART—Deel III.

Part III of the Reports of the Aeronautical Research Institute of Amsterdam contains a good deal that is of interest to British aeronautical engineers and designers. The book is, of course, published in Dutch, but each report is preceded by a summary in French, English and German, and as the subject matter of the report is familiar and diagrams and tables are more or less a universal "language," there should not be any great difficulty in following the general sense of the various reports and the results arrived at.

Report A.33 deals with experiments on the pressure distribution on the fuselage of an aeroplane model, tested with a thick wing resting directly on its upper surface, and also tested without the wing. The tests show the influence on the air flow over the fuselage of a thick wing so placed. Plottings are given both for the fuselage by itself (*zonder draagvlak*) and with the wing in position (*met draagvlak*).

Report No. A.58 gives a nomogram for the correction of incidence and drag of model aerofoils tested in an airstream of finite dimensions, and this nomogram is directly applicable to making the necessary corrections to model tests in the tunnel.

In Report A.77 experiments carried out on the pressure drop in an air current, caused by the metal gauze, used to represent radiators, are described, and the results given.

Report A.96 describes experiments with and results obtained from a preliminary investigation of the influence of a rotating cylinder placed in the leading edge of an aerofoil. These tests have already been described in Flight (January 15, 1925).

Space does not permit of a detailed reference to the rest of the reports, but an indication of their nature is provided by the titles, which are as follows:—M.14a: Experiments on the protection against humidity of wooden aeroplane parts by means of protective coatings of oil varnish. V.79: Photographic time studies of aeroplane paths. A.92: Experiments on the cooling power of two different radiators for the Fokker C.IV. A.76: Model experiments on modifications of Fokker C.IV biplane. The latter report contains some interesting data on wings of various section and plan form as fitted to the fuselage of the C.IV.

Copies of the Report can be obtained from Messrs. Gebr. Cleeff, 28, Spui, The Hague, Holland.

PISTON TEMPERATURES AND HEAT FLOW IN HIGH-SPEED PETROL ENGINES.

Under above title a very interesting paper was read by Professor Gibson, D.Sc., of the University of Manchester, before the Institution of Mechanical Engineers, on January 22, 1926. The paper dealt in the main with the results of the measurements of piston temperatures made by the lecturer on the cylinders of various high-speed petrol engines during the past seven years. A number of the measurements were made at the Royal Aircraft Establishment, and the data obtained in these particular tests, along with the methods of obtaining the temperature readings, have been published in Report No. 13, L.A.S.C., May, 1918, of the Advisory Committee for Aeronautics.

The results of the measurements and calculations outlined in the paper led to the following general conclusions:—

(1) Under normal operating conditions, at full load, the temperature at the hottest point of an aluminium alloy piston of 100 mm. diameter, working in an aluminium air-cooled cylinder of good design, varies from 210° to 250°, depending on the design of the piston and the composition of its alloy. This is with a clearance (cold) of about 0·025 in. With such a clearance the drop in temperature between the edge of the piston crown and the cylinder wall is from 25° C. to 30° C. An increase in the piston clearance increases its temperature.

(2) From a thermal point of view there is little to choose between most of the usual aluminium alloys. The difference in temperature between the best and the worst is only about 25° C. With the exception of the alloy containing 8 per cent. Cu and 1 per cent. Mn, all have very nearly the same conductivity at 200°, and these all give similar results in a piston. The Cu–Mn alloy has a lower conductivity and gives a hotter piston. It should be noted that if this alloy is annealed at 450° C. for a short time, its conductivity becomes as high as that of the other alloys and its behaviour in a cylinder would presumably be the same.

(3) A cast-iron piston of normal design and of 100 mm. bore has a maximum temperature of about 440° C. under the same conditions of operation. At medium compression ratios (about 4·7) and at 1,800 r.p.m. it develops some 6 per cent. less power than a good aluminium piston and requires a greater petrol consumption (about 8 per cent.) per brake horse-power. The relative advantage is, however, likely to depend on circumstances. Thus, if the compression ratio is increased, detonation will first make its appearance in the cylinder fitted with the cast-iron piston, and a cylinder which would detonate violently with a cast-iron piston might work perfectly satisfactorily with an aluminium piston. Under these conditions the benefit of the aluminium piston would be much more pronounced. On the other hand, with a very low compression ratio the relative effect would not be expected to be at all pronounced. Recent experiments by the author on a $3\frac{1}{2}$-in. water-cooled cylinder with a compression ratio of 4·26 fitted with alternative pistons show that the improvement caused by the aluminium piston does not exceed some 2 per cent.

(4) The design of the piston affects its maximum temperature appreciably. The best piston examined has no ribs and a comparatively thin centre, the thickness of the crown being roughly proportional to the radius. This piston is some 20° cooler than one of the same weight but of a heavily-ribbed design.

(5) Perforating the skirt of the piston increases its temperature. The saving in weight is so small that such perforations are not to be recommended.

(6) The highest piston temperatures are attained with the weakest mixture capable of giving maximum power.

(7) The temperature of the piston appears to be only very slightly affected by the compression, within the limits of the experiments, being slightly less with the higher compression ratios.

(8) The effect of spark advance on piston temperature is not very pronounced, the highest temperatures, however, being obtained with the minimum spark advance.

(9) In a piston of the slipper type, in which the gudgeon-pin bosses are carried by lugs joining the piston crown, a considerable amount of heat is transmitted down these lugs, and the temperature gradient across the crown is much less than in the normal type of skirt piston. At the same time, owing to the reduced bearing surface, the drop in temperature between the edge of the piston and the wall is greater than in a skirt piston.

(10) In an air-cooled cylinder the hottest point of the piston is not at the centre, but at a point nearer the hottest side of the wall. Even in a water-cooled cylinder the sparking-plug may have a very marked heating effect on the wall in its vicinity, and consequently on the piston. In an extreme case the temperature at the edge of the piston nearest the sparking-plug may even be greater than that at the centre of the piston.

(11) Assuming that the heat transference from a hot gas to a metal surface per second per unit area equals $e\theta^2$, where θ is the difference of temperature in degrees Centigrade, the semi-amplitude of the cyclical fluctuation of surface temperature is given by—

$$a = \frac{e[(T_1 - \theta_0)^2 - (T_2 - \theta_0)^2]}{2\sqrt{2\pi npsk}}$$

For the piston and combustion head surfaces, e has a value which varies from about $3{\cdot}6 \times 10^{-6}$ in gas engines of 6 to 12 in. diameter at speeds in the neighbourhood of 200 r.p.m. to $11{\cdot}0 \times 10^{-6}$ in high-speed petrol engines, at about 2,000 r.p.m. These values are in C.G.S. units. The corresponding values expressed in C.H.U. per sq. ft. per min. are $4{\cdot}4 \times 10^{-4}$, and $13{\cdot}5 \times 10^{-4}$.

(12) In a high-speed petrol engine at 2,000 r.p.m. the fluctuation of temperature in the surface of the piston, if of aluminium, is of the order of ± 5° C.

(13) In a high-speed petrol engine working on the weakest mixture capable of giving maximum power and with an air/petrol ratio in the neighbourhood of 13·5: 1, the heat given to the piston and flowing to the walls is approximately 3·5 per cent. of the heat of combustion of the fuel. When account is taken of the heat dissipated from the under side of the piston, it would appear that the total heat given to the piston is sensibly the same fraction of the heat supply as that found in slow-speed gas-engine tests.

(14) When burning occurs in an aluminium piston this is probably due ultimately to a local breakdown of lubrication, following overheating to a temperature which would not, however, in itself prove destructive.

METALLURGY

"It is impossible to predict the extent to which the use of alloy steels may develop and become of still further importance to the world. Research in this direction is showing that the possibilities of alloy steels are as yet exploited very incompletely; the total field is of enormous extent, and by far the greater part is still unexplored." This paragraph, from the preface of Sir Robert Hadfield's book entitled, "Metallurgy and its Influence on Modern Progress," published by Chapman and Hall at 25*s.* net (postage 9*d.*), is particularly significant in its relation to aircraft manufacture at the present time, when nearly every aircraft firm in Great Britain is turning its attention to the problems of all-metal construction. The part played by Sir Robert Hadfield in evolving alloy steels is too well known to need enlarging upon here, and it has been truly said that Sir Robert holds a place in the "Age of Alloys" similar to that occupied by Bessemer in the "Age of Steel."

Sir Robert Hadfield's book is not in any way a text-book on metallurgy, but it *is* a most fascinating history, to technical and non-technical alike, of human endeavour in the field of metallurgical science. In the space at our disposal it is useless to attempt adequately to review this extraordinarily interesting work, a more extensive review of which we hope to give in another issue; but a very brief outline of its contents may serve to indicate the wide field covered, even if it cannot hope to convey the charm of the style in which the book is written.

The first part of Sir Robert Hadfield's book is historical, and deals with the birth of science, the rise of steam, and the twentieth century. In Part II, which is entitled "Metallurgy," the author treats of such subjects as the importance and antiquity of iron, carbon in simple and alloy steels, the rise and importance of alloy steels, manganese steel, silicon steel, heat treatment and micro-structure of steel, and application of special steels. A large section of the book is devoted to the subject of fuel economy, and another large portion, Part IV, to education and research; while in the last section, Part V, the author takes a peep into the future. The work is profusely illustrated by photographs, reproductions of engravings, and diagrams, and is one which all interested in metallurgy should make a point of obtaining.

CORRESPONDENCE

In order to leave as much space as possible for new articles in THE AIRCRAFT ENGINEER each month, letters dealing with the various points raised will be published in the correspondence columns of FLIGHT week by week. Such letters, referring to the publication of and articles appearing in the first of our monthly technical supplements will be found in FLIGHT of February 11 (from Mr. T. O. M. Sopwith, Mr. W. S. Shackleton, Mr. Oswald Short, Capt. de Havilland, Mr. C. C. Walker, Mr. C. H. Dowty, Mr. H. P. Folland, Mr. F. Sigrist, Mr. W. O. Manning, and Capt. A. S. Keep) and of February 18 (Mr. C. C. Walker and Maj. F. M. Green).

ERRATA

Although a correction was published in the issue of FLIGHT of February 4 of an error which crept into the article by Mr. Handley Page in THE AIRCRAFT ENGINEER of January 28, it is thought that some readers may have missed this, and consequently the corrections are given again here. In Table 3 on p. 3 the last two divisions were headed flap angle — 10° and flap angle — 20°. These should have read flap angle + 10° and flap angle + 20° respectively. In the graph published in the top right-hand corner of p. 3 the positive signs were correctly given.—ED.

AVRO

THE machine illustrated below, which is used as a freight carrier, is an outstanding example of AVRO design and construction.

It can also be operated as a passenger machine to carry twelve passengers in addition to pilot, navigator and attendant, or as a troop carrier.

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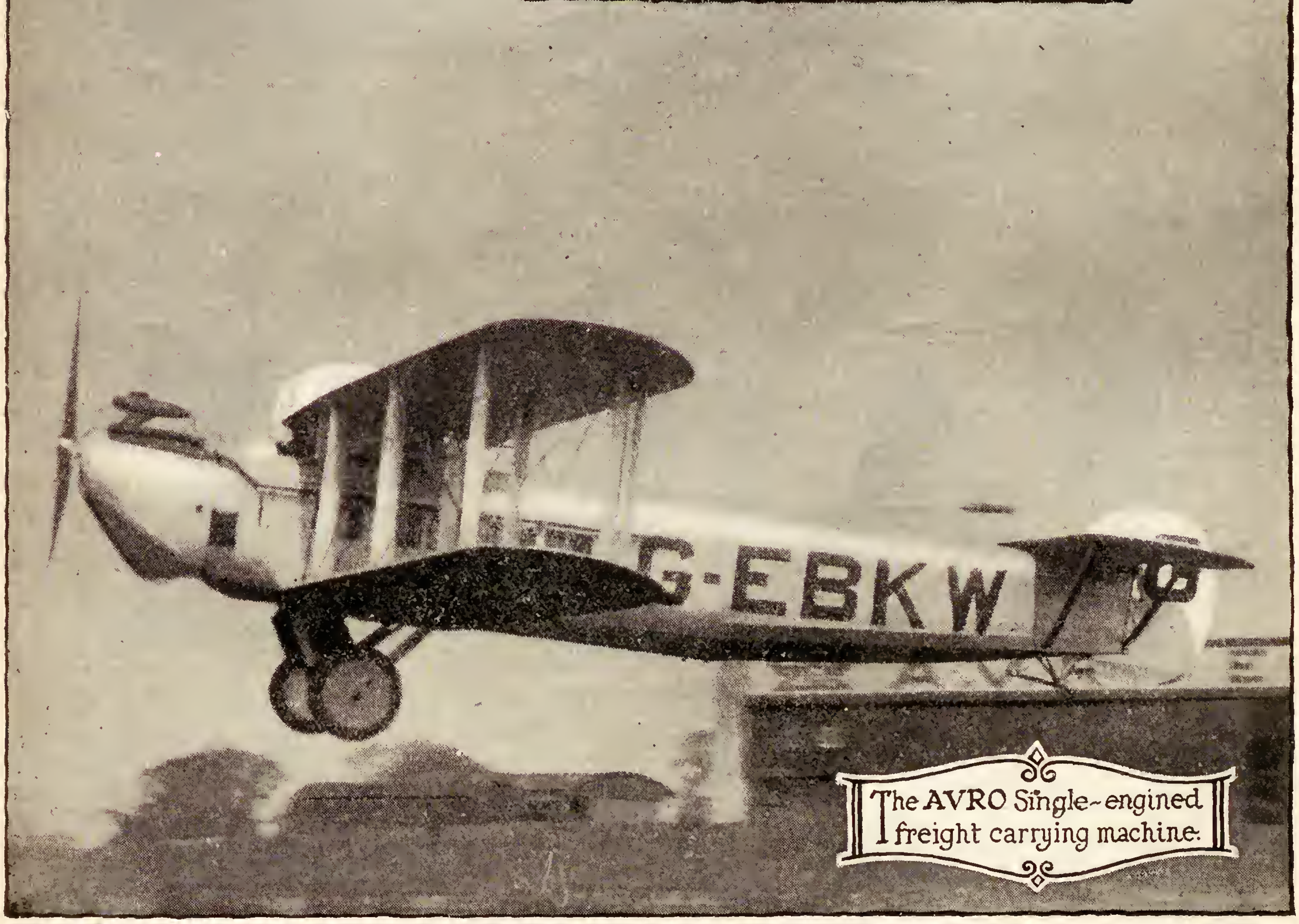

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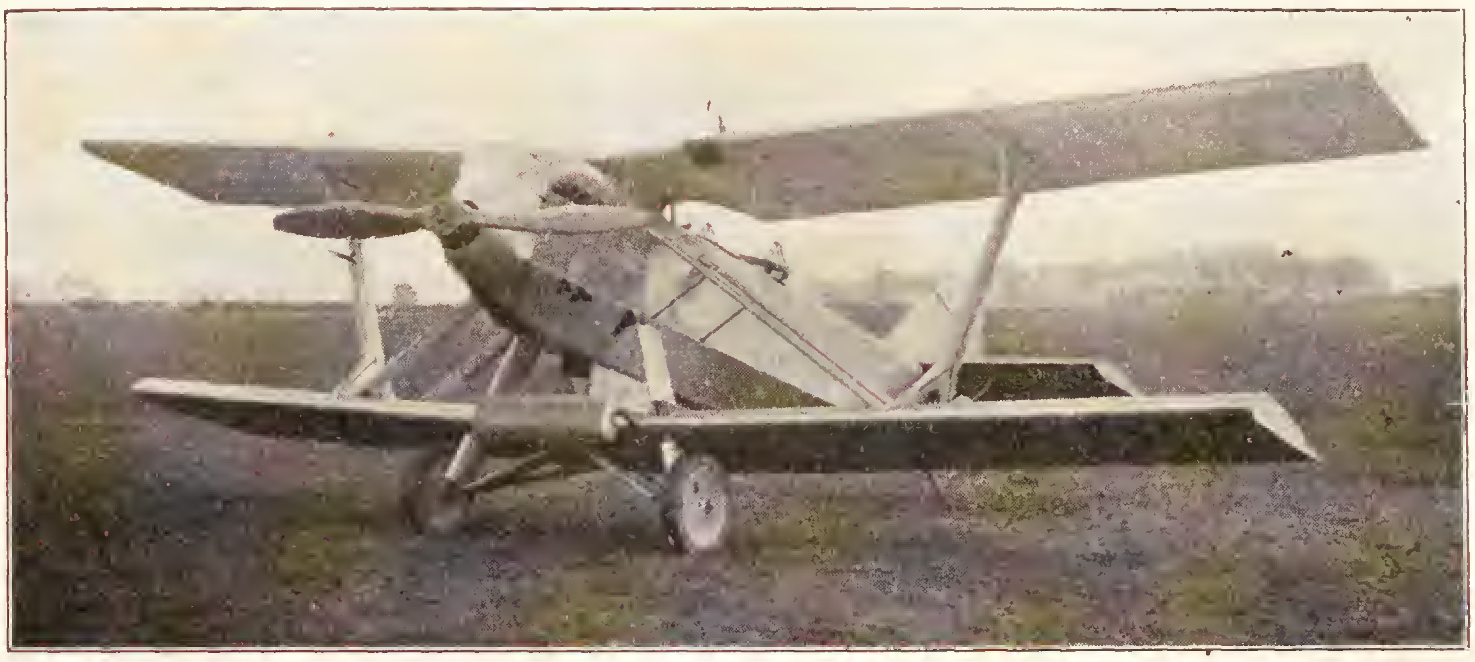
THE BEARDMORE W.B. XXVI

A Machine with Excellent Controllability

In our issue of August 20, 1925, we published the general arrangement drawings and a brief description of the Beardmore W.B. XXVI two-seater fighter, designed and constructed by William Beardmore and Co., Ltd., of Glasgow, for the Government of Latvia. Further particulars of the machine, as well as photographic illustrations, were given in our issue of December 31, 1925. The W.B. XXVI has now been put through its flying tests, and although detailed performance figures may not be given, it is possible to state that recently, when the machine was being tested by Captain A. N. Kingwill, the firm's chief test pilot, the speed range was found to be no less than three to one, which must certainly be regarded as extraordinarily good.

Although not in the nature of performance tests in the ordinary sense of the term, it is interesting to learn that the manœuvrability and structural strength of the W.B. XXVI are very good indeed. In the course of the test flights, Capt. Kingwill dived the machine at over 200 m.p.h., and made a loop immediately on flattening out from the dive. In spite of the very high stresses which must have been imposed upon the machine, no trouble was experienced, and no failure of any structural part occurred. Capt. Kingwill then gave a display of the stunt known as "the falling leaf," and the machine was also rolled and spun. The next tests to which the machine was put were high-speed cornering with the angle of bank approaching the vertical.

After this Capt. Kingwill proceeded to give what was considered to be perhaps the most important demonstration of all. Keeping the machine along a horizontal path the engine was gradually throttled down until the stalling angle was reached. The throttle was then closed and the control stick pulled right back. The machine assumed an attitude of approximately 60 degs. with the horizontal, and commenced to sink on an even keel. By way of showing that the machine was still under control in this fully stalled condition, Capt. Kingwill rocked it laterally and pitched it fore and aft. A similar demonstration was then given with the engine full on. Flying horizontally at about 1,000 ft. altitude, Capt. Kingwill commenced to climb almost vertically, until the machine stalled and started to fall tail first. The engine was full on, and it was noticed that the nose of the machine merely dropped slightly and the machine commenced to sink. The angle of the fuselage as before was about 60 degs. to the horizontal, and it was again demonstrated that all the controls were fully operative. Considering that the Beardmore W.B. XXVI is not fitted with any unusual forms of lateral controls, this achievement is one of which the designer, Mr. W. S. Shackleton, may well be proud.



A MANŒUVRABLE MACHINE: The Beardmore W.B. XXVI has recently been put through some severe performance and controllability tests, from which it has emerged with flying colours.

Technical data relating to the Beardmore W.B. XXVI have already been published in Flight in the articles referred to above, and a technical description of the undercarriage, which is of unusual design, will be found in The Aircraft Engineer supplement. The machine has repeatedly been taxied at high speed on rough ground without trouble.

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THE WORLD'S AIRWAYS*

Under the title of "A Commercial and Historical Atlas of the World's Airways," an ambitious handbook has just been issued and compiled by Francis J. Field, Ltd., of Sutton Coldfield (Birmingham), a name, no doubt, well known to some of our readers in connection with that latest hobby, Air Mail Philately, or "Aero-philosemy." We say ambitious, for we fully appreciate the extreme difficulty experienced in obtaining anything like complete and reliable data regarding commercial air services, special or experimental flights, &c., that have taken place in various parts of the world. At the outset, we must say that the publishers of this work are to be congratulated on the thoroughness and completeness of the information they have got together between its sky-blue covers.

In a Foreword by Sir W. Sefton Brancker, the Director of Civil Aviation, says: "I wish the best of luck to this enterprising little publication. It is of importance that the general public should know what is being done by the various nations of the world in the development of Air Transport. This 'Atlas' should give a vivid and comprehensive view of this new activity, which will be of such vast importance to the British Empire in the future."

We very much regret that we have not the space to spare for a detailed review of the contents of this "Atlas," and we can only give just a brief outline of what is given. In the main, it contains a large number of maps of various countries, or sections thereof, showing not only the air routes, but the date on which the first flight was made. Accompanying these maps is some descriptive matter, briefly giving the air history of that country. Then there are sections dealing with the following subjects:—"Aircraft: The Servants of Commerce; Insurance against Air Risks; Forwarding Goods by Air; How to Use the Air Mails; Countries Issuing Special Stamps; Air Post Terms; Some Long-Distance Flights; The Balloon Posts of Paris; Collecting Souvenirs of the Air;" &c.

Thus, it will be seen that in spite of the fact that this work is the first of its kind, it is remarkably comprehensive, and the suggestions for improvements asked for by the publishers will, we think, require some finding.

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* "A Commercial and Historical Atlas of the World's Airways." Francis J. Field, Ltd., Birmingham, Price 2*s.* 6*d.* net.

THE AIR ESTIMATES, 1926-27

A Net Increase of £486,990

THE Air Estimates for the financial year 1926-27 were issued last week, and show a net increase over last year's Estimates of £486,990. The gross estimate is £20,864,500, but appropriations-in-aid are expected to reach the value of £4,864,500, thus reducing the total to £16,000,000, as compared with a net estimate of £15,513,010 for last year. Out of the net total, non-effective services account for £245,000, as compared with £143,000 the previous year. Personnel shows a decrease from 36,000 to 35,500.

Effective services are estimated to require the following amounts :—

Votes.		Net Estimates. 1926-27. £	Net Estimates. 1925-26. £
1	Pay, etc., of R.A.F. ..	3,405,000	3,412,000
2	Quartering, stores (except technical), supplies and transport ..	1,507,000	1,459,000
3	Technical and warlike stores (including experimental and research services) ..	6,091,000	5,650,000
4	Works, buildings, and lands	2,347,000	2,572,000
5	Medical services.. ..	209,000	204,000
6	Educational services ..	432,000	486,000
7	Auxiliary and Reserve Forces	406,000	348,000
8	Civil aviation	462,000	357,010
9	Meteorological and miscellaneous effective services	135,000	131,000
10	Air Ministry	761,000	751,000
	Total effective services	£5,755,000	£15,370,010
11	Non-effective services (half-pay, pensions, and other non-effective services)	245,000	143,000
	Total effective and non-effective services ..	16,000,000	15,513,010
	Total net increase ..	£486,990	

Personnel

The grouping and numbers of personnel this year are as follows :—

Air Officers : Vote 1, 19 ; Vote 6, 3 ; Vote 7, 1 ; Vote 10, 12 ; total 35.

Other Commissioned Officers : Vote 1, 2,957 ; Vote 3, 30 ; Vote 5, 210 ; Vote 6, 125 ; Vote 7, 48 ; Vote 10, 130 ; total 3,500. *Cadets* : Vote 6, 120 ; total 120. *Warrant Officers* : Vote 1, 284 ; Vote 3, 1 ; Vote 5, 13 ; Vote 6, 36 ; Vote 7, 10 ; Vote 10, 1 ; total 345. *Non-commissioned Officers* : Vote 1, 4,158 ; Vote 3, 3 ; Vote 5, 205 ; Vote 6, 352 ; Vote 7, 78 ; Vote 10, 4 ; total 4,800. *Aircraftmen* : Vote 1, 21,184 ; Vote 5, 618 ; Vote 6, 784 ; Vote 7, 214 ; total 22,800. *Apprentices* : Vote 1, 400 ; Vote 6, 2,800 ; total 3,200. *Enlisted Indian personnel in Iraq* : 700 ; total 700. Total number to be voted : 35,500. It is pointed out that this number includes Army personnel attached to the Royal Air Force.

Financial Expenditure

Under Vote 1 the summarised figures are as follows : Pay and personal allowances of officers, £1,300,000 ; pay and personal allowances of airmen, £2,406,000 ; marriage allowance, £105,000 ; miscellaneous allowances, £19,000 ; civilians, £799,000 ; service gratuities to airmen on discharge, etc., £26,500 ; recruiting staff and expenses, £11,500. Gross total, £4,667,000. Appropriations-in-aid are expected to reach £1,262,000, which will reduce the net total under this vote to £3,405,000, a net decrease of £7,000.

Under Vote 2 the summarised figures are : Lodging allowances and billeting, £123,000 ; barrack services, £62,000 ; fuel and light, £246,000 ; general stores, £226,000 ; clothing, £293,000 ; provisions and horses, £868,000 ; transport, £450,000. Gross total, £2,268,000. Appropriations-in-aid amounting to £761,000 will reduce this figure to £1,507,000' a net increase of £48,000.

One of the most interesting is Vote 3, technical and warlike stores, which provides for the following amounts : Aeroplanes, seaplanes, engines and spares, £5,351,000 ; experimental and research establishments, £95,000 ; Aeronautical Inspection Department, £132,000 ; aircraft technical and warlike stores, £194,000 ; armament and ammunition, £412,000 ; electrical stores, £307,000 ; miscellaneous research, £241,000 ; miscellaneous material, £309,000 ; balloons and hangars, £23,000 ; mechanical and other transport, £252,000 ; petrol and oil, £496,000 ; rewards to inventors and miscellaneous claims (including war liabilities), £57,000 ; purchase of airships, £30,000 ; airship development, £332,000. Gross total, £8,231,000. Appropriations-in-aid to the value of £2,140,000 are expected to reduce the net total of Vote 3 to £6,091,000, a net increase of £441,000.

The summarised statement under Vote 4, Works, Buildings and Lands, is as follows : Staff for works services, £235,000 ; new works, additions and alterations, amounting to £2,000 each and upwards, £1,790,000 ; ditto under £2,000 each, £113,000 ; ordinary repairs, renewals and maintenance, £609,000 ; grants in aid of works, £22,000 ; purchases of lands and buildings, £140,000 ; rents, compensations, and reinstatements, £50,000 ; incidental expenses of Air Ministry estates, £15,000 ; provision of telephone and telegraph services, £1,000 ; miscellaneous works services, £13,000 ; stores and plant for works (net), £19,000 ; machine tools, £24,000. Gross total, £2,993,000. Deduct for probable under-spending £150,000 and appropriations-in-aid, £496,000. Net total £2,347,000, a net decrease of £225,000. It is pointed out, however, that further provision for works services is included under Votes 3, 8 and 9.

The Medical Services, Vote 5, are estimated to require £209,000, as follows : Pay and personal allowances of officers, £133,000 ; pay and personal allowances of airmen, £114,000 ; nursing service, £32,000 ; fees, etc., to civil medical practitioners, £3,500 ; civilians employed in hospitals and sick quarters, £10,200 ; medical stores and supplies, £14,000 ; payments to hospitals, £35,000 ; miscellaneous charges, £5,800. Gross total, £347,500. Appropriations-in-aid, £138,500. Net total, £209,000, a net increase of £5,000. The net total excludes the cost of the headquarters staff of the Director of Medical Services, and of the medical staff engaged on recruiting, research and Reserve duties, provision for which is made in Votes 10, 1, 3 and 7 respectively.

Educational services (Vote 6) are estimated to require the following amounts : Royal Air Force Staff College, Andover, £13,500 ; R.A.F. Cadet College, Apprentices Wing, Cranwell, £164,700 ; School of Technical Training (Apprentices), Halton, £219,100 ; general and vocational training of airmen, £46,700 ; miscellaneous educational services, £4,000. Gross total, £448,000. Appropriations - in - aid, £16,000. Net total, £432,000, a net decrease of £54,000.

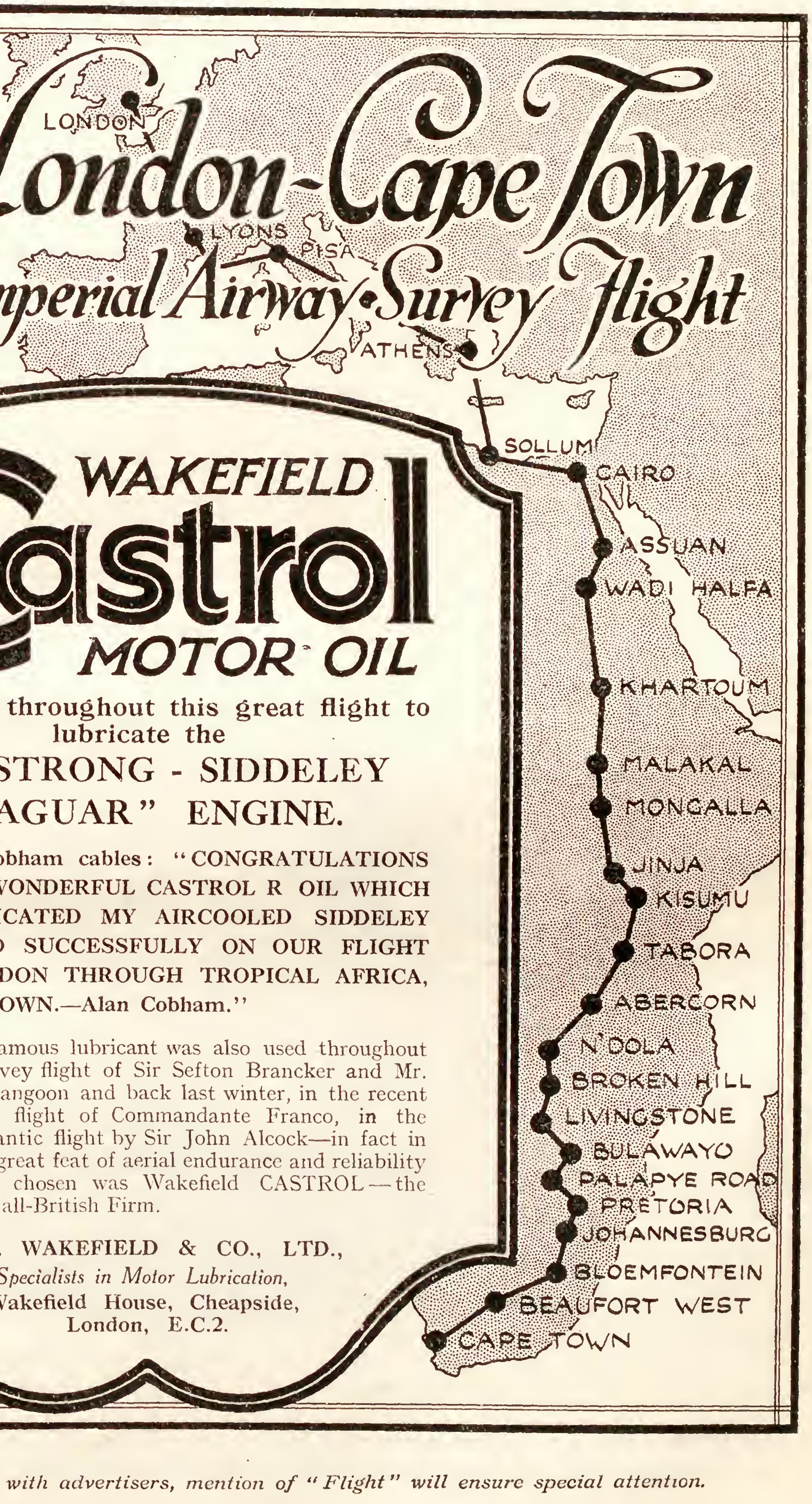
Vote 7, Auxiliary and Reserve Forces, is estimated to require £406,000, as follows :—*R.A.F. Reserve :* Pay and personal allowances of permanent staff, £4,000 ; pay and personal allowances during training, £13,000 ; retaining fees and reserve pay, £142,800 ; capitation payments to civil companies for training, etc., courses, £135,000 ; miscellaneous expenses, £1,300. *Special Reserve and Auxiliary Air Force :* Pay and personal allowances of Headquarters staff, £6,300. *Special Reserve :* Pay and personal allowances of Regular staff, £29,600 ; training, etc., £2,400 ; miscellaneous expenses, £1,000. *Auxiliary Air Force :* Pay and personal allowances of Regular staff, £18,500 ; grants to county associations, £39,000 ; training, etc., £5,200 ; miscellaneous expenses, £4,400. *University Air Squadrons :* Pay and personal allowances of R.A.F. instructors, £2,900 ; miscellaneous expenses, £900. *Voluntary Aid Detachments :* Miscellaneous expenses, £200 ; gross total, £406,500 ; appropriations-in-aid, £500 ; net total, £406,000 ; net increase, £58,000.

Civil Aviation, Vote 8, is estimated to require the following amounts :—Civil aviation aerodromes, £30,500 ; air routes surveys, etc., £30,000 ; technical equipment, £14,000 ; works, buildings and lands, £216,500 ; miscellaneous, £2,000 ; civil aviation subsidies, £180,000 ; gross total, £473,000 ; appropriations-in-aid, £11,000 ; net total, £462,000 ; net increase, £104,990.

It is estimated that Vote 9, Meteorological and Miscellaneous Effective Services, will require the following amounts :—Compensation for losses, etc., £12,000 ; losses by exchange, etc., £100 ; medals, £100 ; telegraphic and telephonic charges and postage abroad, £58,300 ; meteorological services, £77,000 ; miscellaneous, £18,000 ; allowances to ministers of religion, £6,500 ; gross total, £172,000 ; appropriations-in-aid, £37,000 ; net total, £135,000 ; net increase, £4,000.

As in previous years, Vote 10 (the Air Ministry) is a large

The London-Cape Town Imperial Airway Survey Flight



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one, amounting this year to £761,000 net, under the following subheads :—Salaries and allowances of the Air Council and Department of the Secretary, £319,990 ; salaries and allowances of the Department of the Chief of the Air Staff, £155,765 ; salaries and allowances of the Department of the Air Member for Personnel, £50,710 ; salaries and allowances of the Air Member for Supply and Research, £143,192 ; salaries and allowances of the Directorate of Civil Aviation, £14,467 ; salaries and allowances of the Meteorological Office, £48 948 ; pay of messengers, porters, etc., £27,204 ; contingent expenses, £1,724 ; gross total, £762,000 ; appropriations-in-aid, £1,000 ; net total, £761,000 ; net increase, £10,000.

The last Vote, No. 11, is for non-effective services, which are expected to require £245,000, as follows :—Awards to officers, warrant officers, non-commissioned officers and aircraftmen, £350 ; half-pay of officers, £3,500 ; service and disability retired pay and gratuities of officers and nurses, £168,000 ; pensions and gratuities to wounded officers, £700 ; service and disability pensions and gratuities—warrant officers, non-commissioned officers and aircraftmen, £31,500 ; pensions, gratuities and allowances to widows, children, etc., £12,600. Civil non-effective payments : Recurrent charges, £5,550 ; non-recurrent charges, £8,200 ; injury grants, £7,900 ; commutation of retired pay, wounds pensions, etc., £7,700 ; relief fund, £500. Gross total, £246,500 ; appropriations-in-aid, £1,500 ; net total, £245,000 ; net increase, £102,000.

As in previous years, the Air Estimates are accompanied by a memorandum by the Secretary of State for Air, in which Sir Samuel Hoare elucidates certain points. This memorandum is given in full below.

MEMORANDUM BY SECRETARY OF STATE FOR AIR

THE net air estimates submitted to Parliament for the coming year amount to £16,000,000, an increase of £487,000 on those of the current year. There is, however, a decrease of the gross estimates, owing to a reduction of that part of air expenditure which falls finally on the Middle East Vote in respect of Iraq, Palestine and Transjordan, and on Navy Votes in respect of the Fleet Air Arm. The comparison between the two years is shown in detail in the following table :—

	1925.	1926.	+ or —
	£	£	£
Net estimates	15,513,010	16,000,000	+ 486,990
Appropriations-in-Aid :—			
Middle East (Air and ancillary services) ..	3,116,700	2,921,500	— 195,200
Middle East (supplies to British and Indian troops on repayment and other recoveries)	448,300	299,800	— 148,500
Fleet Air Arm	1,320,000	681,000	— 639,000
Ordinary Appropriations-in-Aid	921,300	962,200	+ 40,900
Gross estimates	21,319,310	20,864,500	— 454,810

The decrease in the provision for the Middle East represents another stage in the progressive diminution of the British forces in Iraq and Palestine ; its continuance depends on the absence of any serious set-back to the political stabilisation of those countries. The decrease on the Fleet Air Arm is mainly due to the non-recurrence of capital expenditure on new equipment ; there is to be no diminution of the strength of the Arm in the coming year, but on the other hand the further increase to which reference was made last year has been postponed by agreement with the Admiralty.

The increase on the net estimates reflects the higher level of strength of the Home Defence Force ; expansion has been proceeding during the current year, and although the actual development during the coming year will be less, the average requirements of this part of the Air Force over the year both in personnel and material are inevitable greater. But expenditure in this direction has been offset by all possible administrative economies, and the net total of some of the votes shows a decrease.

While, however, the gradual growth of the Air Force for home defence continues, the actual rate of expansion is decreased. This is a consequence of a decision of His Majesty's Government to relax, in view of the international and financial situation, the efforts which have hitherto been made to complete the authorised programme at the first possible date. When, in 1923, the then Government decided to increase the strength of the home defence force to 52 squadrons (39 regular) it was contemplated that this could be achieved by the year 1928. It had already become apparent, however, that the very complicated interlocking programme of land purchase, building, recruiting, training and equipment could hardly be completed before the year 1930. The effect of the recent decision is that in existing circumstances even this date need not be aimed at for completion of the programme, and that the advances towards it, in the next year or two at any rate, can be gradual and deliberate. This decision—which relates only to the rate of progress, not to the strength to be eventually attained—is open to review in accordance with the international situation, and in particular with the results of international discussions on disarmament. Apart from such contingencies, which are still in the future, the total of Air Estimates will necessarily rise considerably in future years. The slackening of the advance makes it possible to avoid in 1926 the substantial increase in expenditure which was impending, but the deferment is temporary.

Strength, Distribution and Employment of the Air Force.

During the past year the strength of the Air Force has been increased by two Regular squadrons, one Special Reserve squadron and four Auxiliary Air Force squadrons, and, apart from training units and establishments, is at present approximately equivalent to 61 squadrons, 56 of which are maintained on a regular basis.

Of the regular units 45 are organised on a squadron basis (in addition to two detached flights), the remainder being composed of 18 flights (numerically equivalent to about 9 squadrons) provided for service in the Fleet Air Arm, and two flights controlled by the Air Ministry for operation from coastal bases.

The distribution on a squadron basis is as follows :—

	Regular.		A.A.F. & S.R.
	Squadrons.	Flights.	Squadrons.
Home	27	1	5
Iraq	8	—	—
India	6	—	—
Egypt, Palestine and Transjordan	4	—	—
Aden and Somaliland	—	1	—

The Home Defence Force now consists of 25 squadrons. including 1 Special Reserve and 4 Auxiliary Air Force. Considerable progress has been made in the preliminary arrangements for the formation of two additional squadrons, one Special Reserve and one Auxiliary Air Force, and it is proposed to form these two squadrons in the financial year 1926. The one new regular squadron which it is also proposed to add to the Home Defence Force during the year will, it is anticipated, become available by withdrawal from overseas.

The post of Air Officer Commanding Air Defences of Great Britain was instituted about a year ago with a small staff which has so far been engaged on preliminary work, the supervision of training, &c., with temporary headquarters at the Air Ministry. During the forthcoming year it is proposed to advance a further stage, and to place under this Command, which will shortly be moved from the Air Ministry, two new Headquarters which are to be formed for the control respectively of the Fighting and Bombing squadrons of the Home Defence Force. One of these Headquarters will be in substitution for an existing Group.

The strength of the Fleet Air Arm remains at 18 flights, the increase of four flights which it was proposed to effect in 1925 having been postponed, in conformity with a deferment of the completion of the aircraft-carrier for which they will be required.

The provision of squadrons for co-operation with the Army remains unchanged.

Following upon the settlement by the League of Nations of the northern boundary of Iraq, it is proposed to proceed with the scheme for the progressive reduction of the Imperial garrison in that country, provided that there are no untoward political developments.

Three squadrons continue to be maintained in Egypt, and a detached flight of three aircraft at Aden with one machine in reserve in Somaliland. One squadron is provided for Palestine and Transjordan, one flight of which is stationed in the former country and two flights allocated to Amman.

The effective use of aircraft in tribal control already demonstrated in Iraq, Transjordan and Somaliland, was further illustrated by the operations against the Mahsud on the North West Frontier of India in March and April, 1925. The conspicuous success of these operations in which aircraft alone were employed has been recognised by the Government of India. Aircraft have been employed within the last few weeks in a minor operation in the Nuba Mountains in the Sudan.

When I introduced the Air Estimates for 1925 I stated that it was proposed during the course of the year to undertake certain long-distance flights. One of these flights has already taken place, R.A.F. aircraft from Egypt having visited Nigeria, passing through Upper Egypt, the Soudan and French Equatorial Africa. The flight was an unqualified success, and valuable experience was obtained. Arrangements are complete for another R.A.F. long-distance flight in Africa; this will be from Cairo to Capetown and back, and the aircraft will leave Cairo in a few weeks' time. Further flights of a similar kind are in contemplation.

In July a flight of seaplanes from Malta visited Italy and returned the visit of a flight of Italian seaplanes to Malta which had taken place earlier in the year.

Personnel.

The decision to spread over a longer period the building up of the Home Defence Force has made it possible to maintain approximately stationary the numbers and cost of personnel during the coming year. Vote A (maximum numbers allowed) shows as compared with last year a slight decrease of 500 (*mainly due to the substitution of civilian for service personnel*) and Vote 1 (pay) shows a *net* decrease of £7,000. Further progress has been made in economising the use of officers, and provision is made for 208 airmen pilots as compared with 139 last year. Ex-officers are being appointed in a civilian capacity as recruiting officers, and this change, together with other economies, has allowed of a reduced provision for recruiting. Further progress has been made in the substitution of civilians for airmen, and the number of the former provided in Vote 1 increases by over 250. Difficulty has been experienced in obtaining the airmen clerks required, and the good type of boy obtained for training as aircraft apprentice has encouraged the Air Ministry to adopt a similar scheme for clerks. Provision is accordingly made for 96 boys under training as apprentice clerks. The reduction effected last October in the pay of new entrants—both officers and airmen—affects Air Estimates during the coming year comparatively slightly, but the saving will increase year by year.

The cost of the medical services will be approximately the same as last year, Vote 5 showing a saving of £8,000 on the gross total and an increase of £5,000 on the net total. The main reduction effected in the Estimate has been in the provision for medical services in the Middle East—a reduction which does not affect net Air Votes.

A saving of over £50,000 has been effected in the cost of educational services (Vote 6). This decrease is largely the result of a close investigation into the establishments of the two great training stations, Halton and Cranwell; the economies are administrative, and do not impair the training curricula. The number of apprentices at Cranwell is further reduced, newly entered aircraft apprentices being trained at Halton.

Reserve and Auxiliary Forces.

The development of the Reserve and Auxiliary Forces and of the two University "Air Squadrons" described below, is to be continued during 1926, and Vote 7 is accordingly increased by £58,000. The re-equipment of the civil flying schools with aircraft of modern type for the training of Reserve Officers is progressing, and the higher cost of this training is reflected in the provision. Now that the supplementary source of recruitment for the Reserve of Air Force Officers from amongst qualified pilots trained during the late war is practically exhausted, an experimental scheme has been launched for the enrolment of young men, and their training *ab initio* as pilots, in the Reserve. Provision is taken for continuing this scheme on a small scale during 1926.

A beginning has been made with the formation of Special Reserve and Auxiliary Air Force squadrons, and these squadrons will, as already mentioned, be further developed during the year. The intake of volunteers in the squadrons already formed varies considerably in the different localities, and the estimate under this head is consequently still somewhat tentative in character.

During the latter part of 1925 provision was made at the Universities of Oxford and Cambridge to enable members of those universities to obtain knowledge and experience of all matters connected with aviation. Although the term "Air Squadron" has been adopted for convenience of use, no unit organisation has been introduced, and all instruction is given individually in the form of courses which are both practical and theoretical. The object of these courses is to influence the flow of candidates for commissions in the R.A.F., the Air Force Reserve and the Auxiliary Air Force, to stimulate interest in air matters generally at the universities, and to promote and maintain a liaison with the universities in technical and research problems affecting aviation. Except in so far as the qualifications of members, independent of their connection with the "Air Squadrons," render them eligible and willing to enrol in one or other of the non-regular Forces, they will have no liability for Air Force service. In each "squadron" there is a Chief Instructor, who is, at Oxford, a professor of the university, and at Cambridge a wing commander of the Regular Air Force. In addition a regular officer and two airmen are attached to assist in the instruction of the members. The provision taken in Vote 7 for the two "squadrons" (pay, etc., of instructors and miscellaneous expenses) approximates to £4,000.

Technical Equipment.

A net increase of £441,000 is shown in Vote 3 (Technical Equipment and Research). The gross expenditure is, however, £350,000 less than that shown in the Estimates for 1925, Appropriations-in-Aid being down by £791,000. This decrease is due to the reduction in expenditure on account of the Middle East and the Fleet Air Arm.

The Vote includes provision for research and technical development (as shown in Appendix 2 of the Estimates) and for airships. These are separately referred to below. The remainder of the Vote is concerned with provision for the standard technical equipment of the Air Force and for the services of inspection, etc., allied thereto.

While additional expenditure of a capital kind on Technical Equipment in 1926 will not be heavy, the increased maintenance requirements of the expanded force must be taken into account. The circumstances make it unlikely that the liabilities for which provision is taken will fail to mature before the end of the year, and accordingly no lump sum deduction has been made for underspending as was done in 1925. It should be noted that the comparison between the figures in the individual sub-heads of the Vote for the two years are to this extent vitiated; for instance, on the main Sub-head A (Aeroplanes, Engines and Spares) the apparent decrease should be discounted by (say) £200,000.

Research and Technical Development.

Sub-head B of Vote 3 now comprises the out-station research and experimental establishments previously shown in Sub-head C, in addition to the Royal Aircraft Establishment at Farnborough. The estimate for this Establishment has been rearranged so as to show separately from the main organisation the cost of certain sections whose work is not directly connected with that of the Establishment, and which are merely located at Farnborough for convenience. Sub-head C (now comprising Aeronautical Inspection only) is excluded from Appendix 2 of the Estimates as this service is not in any sense peculiar to experimental work. Appendix 2, which can now be taken as showing with approximate accuracy the extent of research and experimental services, shows a net increase of £19,000.

This small increase is largely accounted for by the addition which it has been found necessary to make to the staff concerned with the stressing for airworthiness of service and civil aircraft, in order to avoid delay in carrying out work which the department is under statutory obligation to perform. The remaining expenditure is maintained at much the same level as in 1925. It has only been possible to achieve this result by careful adjustment, since research and technical development are active at the present time, and commitments tend to increase.

It may be mentioned that a number of experimental machines have been ordered embodying the principle of the Cierva Autogyro, of which a preliminary test was recently carried out at Farnborough. The offer of a prize for a helicopter which was announced some two years ago comes to an end on April 30 next; a number of entries have been received, but no machine has yet passed any of the tests. It has been decided to close down the attempt (initiated by the Ministry of Munitions during the war) to construct a helicopter in a Government Establishment, to the design of, and under the supervision of, Mr. Louis Brennan, C.B., whose distinguished abilities as an inventor have been often demonstrated in the past. In the present instance, I am advised by the Aeronautical Research Committee that, in spite of the great mechanical ingenuity of the apparatus, the progress made with the experiments does not warrant their continuance; I have felt compelled, with regret, to accept this advice.

Airships.

The present Estimates carry the programme initiated by the late Government into its third year. This programme is divided into two parts—(1) airship development under the direct control of the Air Ministry, including the construction of a 5,000,000 cubic ft. airship at the Royal Airship Works at Cardington; and (2) construction of an airship of the same capacity by a private company at a cost of £350,000.

The Air Ministry programme has been considerably retarded by the break-away of the R.33 in April last. Although the resulting experience was of considerable value, the refit of the airship delayed the carrying out of the projected series of experimental flights until the latter part of 1925.

The programme was, however, then completed, this being the first occasion on which these particular full scale aerodynamic tests, to which all independent authorities have attached the greatest importance, have been carried out in this country or elsewhere. In addition an aeroplane was successfully released from and re-attached to the airship in flight, thus establishing the future possibilities of the employment of airships as aircraft carriers. This experiment was also the first of its kind that had been successfully carried out in this country.

In consequence of the urgent need for economy, it has been decided, whilst the main lines of the programme will be kept intact, to spread its completion over a longer period than was originally contemplated; a flight by one of the existing airships to Egypt, which was originally planned for 1926, will not now be carried out, since the experience to be gained by it, though desirable, is not considered essential; arrangements are being made for the disposal of all Air Force and civilian personnel whose services are not likely to be required for the next year or so; and Pulham Air Station is being put upon a care and maintenance basis. As the result of these economies, the net provision for all airship expenditure in current estimates is reduced to £335,000.

Works.

Vote 4 (Works, Buildings and Lands) shows a net decrease of £225,000 as compared with 1925. The provision directly attributable to purchase of land and erection of buildings for the Home Defence Air Force is £1,130,000 as compared with £1,280,000 in 1925; if the original programme of expansion had been adhered to these services would have shown a large increase. So far as major new works at Home Stations are concerned, the provision is confined very largely to the amount necessary to meet liabilities already incurred. New services account for £122,500 only out of a total provision of £1,579,100 for major new works at Home Stations.

In respect of Egypt provision is taken for the continuation of approved services and for certain urgent new services in accordance with the policy of gradual replacement of makeshift temporary accommodation by more satisfactory semi-permanent buildings.

The provision for works services in Palestine, Transjordan and Iraq shows a reduction of £79,300 as compared with 1925.

As in the Estimate for the present year, and in accord with the view recently expressed by the Public Accounts Committee, a lump sum deduction has been superimposed on the gross total of the Vote, in order to discount the delays which frequently affect Works expenditure under contract.

Civil Aviation.

The provision for expenditure in connection with Civil Aviation shown under Vote 8 covers as in former years the maintenance of the airport of London at Croydon and the aerodrome at Lympne, ancillary services (other than meteorology) on the regular air routes, operational experiments and the supply of technical equipment for these purposes.

The amount of the subsidy payment to Imperial Airways Ltd. in respect of their European services is unchanged, but the terms of the Agreement dated May 15, 1924, have been modified by a supplemental agreement dated December 18, 1925, and published as a white paper (Cmd. 2574), to provide for the conversion of the minimum mileage requirement of 1,000,000 miles per annum into an annual "equated" horse-power mileage requirement of 452,000,000 horse-power miles.

With a view to the eventual establishment of a weekly civil air transport service between Egypt and India, an agreement has also been entered into with Imperial Airways Ltd. for the operation of a regular fortnightly air service with three-engined machines between Egypt and Basrah via Baghdad and between Basrah and Karachi. The maximum annual subsidy payable to the company under this agreement is £93,600. The service should be commenced not later than January 1, 1927. This agreement will also be published shortly as a white paper. Provision has been made for payment of £30,000 for the subsidy likely to accrue up to March 31, 1927, and also for a capital expenditure of £31,500 for the establishment of the necessary ground organisation and ancillary services for this air route.

A sum is again included for the financial assistance of a limited number of light aeroplane clubs, five of which have been approved under the terms of the Air Ministry scheme, and have commenced operations during the past year: the headquarters of these clubs are in London, Leeds, Birmingham, Newcastle-on-Tyne, and Manchester. It is expected that a sixth club will be approved in due course.

The enlargement and improvement of the airport of London at Croydon has been long in contemplation, and its need was emphasised by the Colefax Report (Cmd. 2351); but it has been delayed by causes over which the Air Ministry had no control. Now that the requisite powers have been conferred by the Air Ministry (Croydon Aerodrome Extension) Act of last session the work is being pressed on with. A sum amounting in all to £164,000 (largely reprovision of money voted in previous years) is provided for this purpose in the coming year.

The increase of £105,000 on the vote as a whole is attributable to the proposed expenditure at Croydon and on the Egypt—India commercial air service, but the total cost of the latter should be offset by a more than corresponding saving on other votes.

Meteorology.

The provision for meteorology in these Estimates remains practically unchanged. This does not imply any stagnation, either on the side of scientific investigation or on that of practical application; but in order to avoid an increase of expenditure the provision for routine services has had to be very strictly scrutinised.

On the purely scientific side, valuable work is being done on such subjects as atmospheric electricity, terrestrial magnetism and seismology, especially at the Kew and Eskdalemuir Observatories. It is fully recognised that the practical application of any science cannot be divorced from the study of the pure science itself.

In addition to the general forecasts which are broadcast daily as part of their ordinary programme, the British Broadcasting Company commenced during the year to issue twice daily from their high-power station at Daventry a special weather bulletin for farmers and sailors. This development of wireless telephony enables meteorology to be applied directly to the practical problems of agriculture, industry and navigation in a way which was not dreamt of before the advent of wireless.

To meet the ever increasing demands made by aviation, both service and civil, for prompt and accurate weather reports at all hours of the day and night, it has been found necessary to reorganise the forecast service at headquarters. It is now possible for an aviator, in any part of the country and at any time, to obtain within a few minutes a report on the weather conditions along any air route and a forecast of the probable changes in the course of his journey.

Air Ministry.

Vote 10 (Air Ministry) shows an increase of £10,000. This is less than the total amount of increments of pay under approved scales, without which the Vote would have shown some reduction on last year's figures. Such additions to the staff as have been found necessary (principally for technical development and equipment and for common services) have been more than set off by economies, especially in the Works and Buildings Directorate, where they have been made possible by the retardation of the building programme.

ROYAL AERONAUTICAL SOCIETY NOTICES

Lecture.—The Council of the Royal Aeronautical Society have great pleasure in announcing that Marchese de Pinedo, the Italian airman who recently flew from Italy to Australia in a Savoia seaplane, and back *via* Japan, will lecture before the Society on his experiences. The lecture will be delivered in English in the theatre of the Royal Society of Arts, on Thursday, April 8, 1926, at 6.30 p.m.

When it became known that Mr. Cobham would not be back in time to give his lecture before the Society on the date originally arranged, Flight-Lieut. H. Cooch agreed to deliver his lecture on that date. Mr. Cobham's lecture on "Long Distance Aeroplane Flights," therefore, will be delivered before the Society on March 18, 1926, at the Royal Society of Arts, 18, John Street, Adelphi, W.C. 2.

Branches.—The Council have approved of the formation of a branch of the Society at Coventry. This branch has already some 200 members. The formation of a number of other branches is now under consideration.

J. Laurence Pritchard,
Hon. Secretary.

THE AIRSHIP CLUB

A meeting of the Committee of the Club was held at 3, Clifford Street, on February 18.

The minutes of the previous meeting were read and confirmed, and the Committee gratefully accepted the offer of Mr. Griffith Brewer to present the Club with an 80,000 C.F. Balloon.

It was decided that the balloon should be entered for the Gordon Bennett Race if found suitable after inspection, and the Club's financial liability should be limited to the entrance fee.

It was decided to accept the terms offered by Mr. B. Woodward, Solicitor, for the formation of Airship Clubs, Ltd., for £20, and that he be asked to proceed with the work forthwith.

A Sub-Committee consisting of Lieut.-Col. Lockwood Marsh, Mr. A. L. Preston, and Commander Boothby, was appointed to draw up and submit proposals to the Air Ministry for acquiring an airship, and to consider the question of a landing ground at Hendon. Lord Cunliffe was appointed to act as Assistant Hon. Secretary.

The following gentlemen were elected members:—

Lord Montagu of Beaulieu, Lieut. R. Collins, R.A.F., Messrs. B. N. Radford, Lionel Green, J. R. Cox, S. Humphries, C. Arbuthnot Lane, Charles Verner, Francis Yorke-Smith, P. C. Holmes, H. H. Morris, G. Dorman, T. H. Spottiswood.

Members who have not yet forwarded their first annual subscription are requested to do so.

F. L. M. Boothby, *Hon. Secretary.*

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AIR MINISTRY NOTICES

NOTICE TO GROUND ENGINEERS

Locking of Cap on Sump Spindle of A.G.S. Petrol Filter

Immediate action should be taken to provide on all aircraft a positive lock for the cap (Pt. No. 8) on the bottom of the sump spindle (Pt. No. 4) of A.G.S. petrol filters, A.G.S. Nos. 600, 601 and 602. This is to be effected by removing the existing lock nut and sweating the cap to the sump spindle.

In cases where a drain cock or other fitting is substituted for the cap, a similar precaution must be observed.

(No. 1 of 1926.)

NOTICE TO AIRMEN

Telephone at Penshurst Landing Ground

1. The telephone in the caretaker's hut at Penshurst landing ground (No. — Penshurst 10), which has hitherto been available for calls to certain numbers only, may now be used by pilots and also by passengers for calls to any subscriber, providing that the pilot signs the register of calls as a guarantee that his company will be responsible for payment.

2. A record of all such calls will be kept by the Civil Aviation Traffic Officer at Croydon Aerodrome, who will collect the appropriate fees from the aviation companies or individuals concerned. (No. 2 of 1926.)

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The Bristol "Jupiter" Endurance Test

The Bristol "Bloodhound" biplane, fitted with a sealed Bristol "Jupiter" engine, which since January 4 has been carrying out a series of endurance flights between Filton (Bristol) and Croydon, is still going strong. The total number of hours flown now exceeds the 150 mark, and the total number of miles flown exceeds the distance between London and Perth, Australia, and back. We think our readers will agree that, considering that no engine replacements of any kind have been made so far, this is really a most remarkable performance. The average petrol consumption has not exceeded 22·6 gals. per hour throughout the test. The daily log of this test for the last two weeks is as follows :—February 10 : Hours completed, 121 hrs. 53 mins. ; mileage, 13,513. February 11 : Hours completed, 126 hrs. 53 mins. ; mileage, 14,068. February 13 : Hours completed, 130 hrs. 10 mins. ; mileage, 14,427. February 15 : Hours completed, 131 hrs. 39 mins. ; mileage, 14,591. February 16 : Hours completed, 134 hrs. 1 min. ; mileage, 14,850. February 17 : Hours completed, 135 hrs. 6 mins. ; mileage, 14,971. February 18 : Hours completed, 143 hrs. 0 min. ; mileage, 15,859. February 19 : Hours completed, 151 hrs. 35 mins. ; mileage, 16,813. February 20 : Hours completed, 159 hrs. 55 mins. ; mileage, 17,701. February 21 : Hours completed, 163 hrs. 27 mins. : mileage, 18,092.

An American Polar Flight Scheme

Mr. Robert Anderson Pope, a New York engineer, is organising a Polar flight to take place early this summer. The object of the expedition is to claim for the U.S. the continent supposed to exist in the unexplored region of the Arctic, and, incidentally, a flight over the Pole. It is reported that five 220-h.p. Douglas machines will be employed, and probably the pilots will include Lieuts. Leigh Wade, Lowell Smith and Ogden, who took part in the round-the-world flight, Mr. Noel Wein and Mr. Norman Read (ex-R.A.F.).

IN THE FAR EAST : A Napier-engined Fokker, D. C1, flying over the rice fields of Java.

THE ROYAL AIR FORCE

London Gazette, February 16, 1926

General Duties Branch

Flight-Lieut. M. C. Dick is granted a permanent commn. in the rank stated; Jan. 1. The following Pilot Officers are promoted to rank of Flying Officer :—H. F. Messenger ; Sept. 3, 1925. N. A. West ; Oct. 15, 1925. W. O. Duport ; Jan. 31. J. E. Davies ; Feb. 8. M. H. Jenks (Capt. Glos. Regt., R.A.R.O.) ; Feb. 8.

Flying Officer H. J. M. Berthon (Sub-Lieut., R.N., retd.) resigns his short service commn. ; Feb. 17. Flying Officer E. C. Moon relinquishes his short service commn. on account of ill-health ; Feb. 17. The short service commns. of the following Pilot Officers on probation are terminated on cessation of duty :—J. N. Goodwyn ; Feb. 3. D. C. Field ; Feb. 17.

Stores Branch

Flying Officer J. F. Young, M.M., is confirmed in his appt. in the Stores Branch and is granted a permanent commn. in rank stated ; Feb. 17.

Medical Branch

E. J. Jenkins is granted a short service commn. as a Flying Officer for three years on the Active List, with effect from and with seny. of Feb. 1. Temp. Lieut. H. R. Peck, General List, Dental Surgeon Army, is granted a temp. commn. as Flying Officer on attachment to the R.A.F. ; Feb. 1. He will continue to receive emoluments from Army funds.

Chaplains' Branch

The Rev. G. A. Davies, M.A., is granted a permanent commn. with the relative rank of Squadron Leader ; Jan. 31.

Reserve of Air Force Officers

Pilot Officer A. Smith resigns his commn. ; Jan. 15. Flying Officer P. T. Hubbard is transferred from Class A to Class C ; Feb. 16.

London Gazette, February 19, 1926

General Duties Branch

The following Pilot Officers on probation are confirmed in rank :—R. Connor, E. J. George, S. J. Gilbert, J. D. Greaves, P. E. Grenfell, F. W. H. Hall, A. V. Harvey, A. E. Hill, F. S. Hodder, G. H. C. Ingle, W. T. Jones, H. J. F. Kempthorne, J. C. Lewis, T. K. Merrett, S. F. Prince, J. W. Stokes, D. S. Thomas, G. H. Walker, R. A. Wills, F. G. S. Wilson, J. N. Young ; Jan. 18. N. S. Little ; Jan. 30.

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified :—

General Duties Branch

Wing Commander : A. H. S. Steele-Perkins O.B.E., to H.Q., Inland Area, for Personnel Staff duties 21.2.26.

Squadron Leaders : E. R. Pretyman, A.F.C., to H.Q., Coastal Area ; 9.2.26 ; F. Sowrey, D.S.O., M.C., A.F.C., to No. 41 Sqdn., Northolt ; 29.1.26.

Flight Lieutenants : D. R. W. Thompson, to Elec. and Wireless Sch., Flowerdown ; 19.2.26. R. J. Divers, M.B.E., to R.A.F. Depot, on transfer to Home Estabt. ; 12.2.26. E. Brewerton, D.F.C., to No. 440 Flight, Mediterranean ; 6.2.26. J. B. P. Angel, to Aircraft Park, India ; 12.2.26. R. Harrison, D.F.C., to No. 30 Sqdn., Iraq ; 12.2.26. S. F. Vincent, A.F.C., to No. 2 Armoured Car Company, Palestine ; 27.1.26. H. D. O'Neill, A.F.C., to Aircraft Depot, India ; 12.2.26. T. S. Horry, D.F.C., to Aircraft Depot, Iraq ; 12.2.26. G. R. Oliver, to No. 1 Group H.Q., Kidbrooke ; 8.2.26. C. Hallawell, to Armament and Gunnery Sch., Eastchurch ; 8.2.26. R. J. H. Holland, to Central Flying Sch., Upavon ; 21.1.26.

Stores Branch

Flight Lieuts. : L. A. K. Butt, to the Packing Depot, Ascot ; 1.2.26. A. W. Smith, to Station Commandant, Hinaidi ; 24.1.26.

Flying Officers : A. G. S. Tuke, to Schl. of Tech. Training (Men), Manston ; 1.2.26. B. E. Essex, to Sch. of Army Co-operation, Old Sarum ; 1.2.26. H. J. Hunter, to No. 1 Sch. of Tech. Training (Apprentices), Halton ; 1.2.26. W. F. Langdon, to No. 15 Sqdn., Martlesham Heath ; 1.2.26. L. Horwood, M.C., to No. 100 Sqdn., Spittlegate ; 1.2.26. F. B. Ludlow, O.B.E., M.C., to No. 43 Sqdn., Henlow ; 13.2.26. L. L. Bray, to No. 5 Flying Training Sch., Sealand ; 1.2.26. P. Alderson, to No. 2 Flying Training Sch., Digby ; 1.2.26. H. D. Giblett, to No. 58 Sqdn., Worthy Down ; 1.2.26. R. G. Sims to Air Ministry ; 8.12.25. R. A. Dolton, to No. 39 Sqdn., Spittlegate ; 8.2.26.

Pilot Officer : L. F. Caunter, to M.T. Repair Depot, Shrewsbury ; 4.2.26.

NAVAL APPOINTMENTS

The following appointments were made by the Admiralty yesterday :—

Royal Air Force

Flight Lieutenant : E. Brewerton, D.F.C., to No. 440 (F. Reconn.) Flight ; Feb. 6.

Fleet Air Arm

Lieutenants, R.N. (Flying Officers, R.A.F.) : J. T. Robertson and E. W. E. Lane, to be attached to R.A.F. Training Base, Leuchars, during spring cruise of *Furious* ; Feb. 3.

Lieutenant, E. (Flying Officer, R.A.F.) : K. A. B. Hutson, to be attached to R.A.F. Training Base, Leuchars, during spring cruise of *Furious* ; Feb. 3.

IN PARLIAMENT

Flying Officers' Insurance

Mr. HARRISON, on Feb. 10, asked the Secretary of State for Air whether he can now make a statement upon the question of insurance for those ranks in the Air Force whose duties necessitate their presence in flying machines ?

Mr. Albery asked the Secretary of State for Air whether the Government is taking any steps which will enable flying officers to insure their lives up to a reasonable amount on terms similar to those available to officers in other branches of His Majesty's fighting services ; and if any of the big insurance companies have been approached in this matter ?

Sir S. Hoare : As I stated in my reply to Rear-Admiral Sueter on December 17 last, I have been in communication with the Life Offices Association, of which all important companies are members, and I am pleased to say that the negotiations with the companies have now been brought to a conclusion. Terms have been obtained from nearly 20 companies which are considerably more favourable than those hitherto obtainable, more particularly for officers of the middle and senior ranks, on whom the burden of insurance falls most heavily. In the case of a squadron leader, for example, the extra annual premium quoted to cover flying risks has been reduced from 5 guineas per cent. to 2 guineas per cent.—a reduction by more than half—and this extra premium is limited to five years instead of being payable over the whole period for which cover is desired. A small additional charge is made in some cases to cover future war risks and service abroad. An alternative method, by which the extra premium is charged on each flight subject to a fixed maximum payable in any one year and in total, has also been offered by some of the companies. Particulars of the terms offered by the companies have been brought to the notice of all officers. The scheme as at present agreed applies only to officers, but the question of its extension to other ranks in the Air Force is being taken up with the Life Offices Association.

Air Services

Sir H. BRITTAIN, on February 11, asked the Secretary of State for Air with what cities abroad we are in regular communication to-day by means of air or seaplane service ; and whether any efforts are being made and, if so, in what directions, to extend this service ?

Sir S. Hoare : During the winter months British air services are in regular operation abroad to Paris, Cologne (*via* Brussels), and Amsterdam ; during the summer months the Paris service operates to Zurich (*via* Basle), and the Amsterdam service to Berlin (*via* Hanover). Connections exist by means of foreign air services to many of the most important cities, the number of which varies according to the season of the year. The possibility of extending British air services and of establishing other British services abroad is receiving the constant attention of the Air Ministry and of Imperial Airways, Ltd., who, under the terms of the subsidy agreement, can exercise their discretion in the matter.

Royal Air Force Recruits

Mr. HORE-BELISHA asked the Secretary of State for Air (1) how many men were accepted in the year 1925 for His Majesty's Air Force ; and how many were rejected on account of some physical deficiency ;

(2) what percentage of applicants were rejected for the Air Force in 1925, and what the principal physical defects were, giving the proportions to the total number of rejections ?

Sir S. Hoare : The number of men passed fit for service in the Air Force was 2,885 ; the number rejected as medically unfit was 3,414, or a percentage of 54·19 of those medically examined. The principal causes of rejection, as revealed by examination by Service medical officers, were as follows :—

	Per cent.
1. Deficient and defective teeth..	13·0
2. Diseases of the heart (valvular disease or disordered action)	12·4
3. Poor physique	9.5
4. Diseases of the ears	8·8
5. Deformities of feet	8·6
6. Diseases of lungs	8·1
7. Defects of vision	7·3
8. Defects of extremities	2·3
9. Other causes	30·0
	100·0

R.A.F Stations in Egypt

SIR F. WISE on February 17 asked the Secretary of State for Air how many air stations there are in Egypt ; and what is the cost for 1925-26 ?

Sir S. Hoare : The number of Royal Air Force stations in Egypt, including Command Headquarters and repair and training establishments, is six. The estimated cost for 1925-26, including a detached flight in the Sudan, is £1,170,000.

Cairo to Cape Town Flight

LIEUT.-COMMANDER KENWORTHY asked whether the flight of the four Royal Air Force machines from Cairo to Cape Town, due to start from Egypt on or about March 1, is a preliminary to the establishment of an air-mail service to South Africa by air ; and what preparations are being made to establish and develop such air-mail service ?

Sir S. Hoare : The flight is being undertaken in accordance with the policy of the Air Force to make visits by air to distant parts of the Empire and to gain experience in long distance flying. At the present moment there is no intention of establishing a Royal Air Force mail service to the Cape, but I hope that the experience gained on this and other occasions may help in deciding the practicability of the operations of civil air services on these routes and linking up communications with distant parts of the Empire by air.

R.A.F. Equipment

CAPT. BOURNE asked whether any of the equipment required for the Royal Air Force is ordered from the Royal Aircraft Establishment, Farnborough ?

Sir S. Hoare : Apart from the production of small numbers of instruments and accessories which have not yet been standardised for service use, no equipment for the Air Force is ordered from the Royal Aircraft Establishment, Farnborough.

Air Services and Mails

LIEUT.-COMMANDER KENWORTHY asked the Secretary of State for Air whether, in connection with the about-to-be-established air route to India, he will consider, on the one hand, the linking up of this with European mail services so as to make a continual air-mail line from Croydon to Burma ; whether, on the other hand, he has examined the possibilities of extending the service by air to Australia ; and if he is aware of the advantage to the trade between this country and the Dominions that would follow from an extension of the carriage of mails by air to the Dominions ?

Sir S. Hoare : As regards the first part of the question, the fortnightly air service from Egypt to India and back will be timed to fit in with the arrival and departure of the mail boats, but I hope that ultimately it will be linked up with European air mail services. As regards the second part, the possibility of the extension of the service beyond India is continuously under consideration and investigation. The answer to the last part of the question is in the affirmative.

CORRESPONDENCE

The Editor does not hold himself responsible for opinions expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters intended for insertion in these columns.

THE NAVY AND THE AIR

[2123] Will you allow me to protest against one paragraph only in your leading article in your issue of to-day's date ?

"Yet it would seem that the Government, like the Navy, forgets nothing and learns nothing." The sting is only in the last two words. I don't believe it true of the average British Government, but I am not concerned with them. I do not believe that you really think it true about the Navy.

Doubtless you, when you penned the paragraph, were thinking of the Navy in relation to air works. Before the war the Navy did its share in this respect. During the war, under the administration of Mr. Winston Churchill and Lord Fisher, it did the same. It is again fully alive to the importance of air work at the present day.

Speaking generally, Great Britain may be reduced to submission in a future war. (1) By being starved. (2) By being bombed.

The first it is the duty of the Navy to prevent. The second the duty of the Royal Air Force, assisted by such diversions of the Navy and Fleet Air Arm can bring about.

In the late war we suffered from bombing, though it did not nearly drive us to submission. We did not suffer from starvation, though that was within an ace of reducing us to sue for terms.

The southern counties are therefore prone to give undue weight to the bombing danger, without considering the starvation dangers.

To prevent the latter, the Navy must be properly equipped with aircraft. When money is voted for the Fleet Air Arm, it nearly all goes to purchase flying material. Money voted to R.A.F. has to go largely into ground expenditure.

Money must be voted for both services, but it is hard to understand why the aeroplane trade and Press should try to reduce the efficiency of the Navy either in their own or the national interests. Generally, FLIGHT has been very fair on the matter, and has not joined in the campaign against the Navy being properly equipped with aircraft. This propaganda, supposedly in the interests of the R.A.F., generally takes the form of indicating the Navy, all its works, and all that belong thereto. I am sorry to see indications in the paragraph quoted that FLIGHT is not maintaining its unbiassed attitude to all departments interested in air matters.

F. L. M. BOOTHBY,
Commander, R.N. (*retired*).

Royal Aero Club,
February 18, 1926.

IS STEEL A HOME PRODUCT ?

[2124] I have been interested in the articles and correspondence appearing in your columns lately relating to metal construction. It seems to have been generally assumed that steel has an advantage over Duralumin in that it is a home product.

The biggest bed of iron ore in this country is, I believe, that in the Cleveland Hills, near Middlesbrough ; but it is of poor quality, and combines a low percentage of iron with a high percentage of phosphorus and sulphur. Both of these, and especially the latter, are difficult to eradicate, and are fatal to steel.

Of the pig-iron made in Middlesbrough only about one-third, I think, comes from the local ore, and the iron used in steel manufacture comes largely from the imported ore. An idea of the magnitude of iron ore imports may be gained from the fact that during the last fortnight over 113,000 tons have come into the River Tees from Spain, Scandinavia, India, North Africa, etc. ; and this at a time when only half the available blast furnaces are working. It would appear then that steel is hardly a home produce, and that Duralumin should stand or fall on its other merits.

Some of your readers more in touch with the metal trade than I am myself now may be able to confirm these impressions.

M. LANGLEY.

Southampton.
February 19, 1925.

* * * *

Junkers for S. Africa ?

COINCIDENT with Mr. Alan Cobham's demonstration of the efficiency and reliability of British aircraft comes a report that the South African Government is considering the settlement of a contract with the German Junkers firm regarding the establishment of an air mail service in the Union. With the contract is a subsidy of £80,000.

PUBLICATIONS RECEIVED

Aeronautical Research Committee Reports and Memoranda. No. 954. (*Ae.* 173.) International Trials : Report on Aerofoil Tests at National Physical Laboratory and Royal Aircraft Establishment. May, 1925. Price 2*s.* net. *No.* 1,000.—The Lateral Control of Stalled Aeroplanes : General Report by the Stability and Control Panel. September, 1925. Price 2*s.* net. H.M. Stationery Office, Kingsway, London, W.C. 2.

U.S. National Advisory Committee Reports : *No.* 180.—The Influence of the Form of a Wooden Beam on its Stiffness and Strength. I : Deflection of Beams with Special Reference to Shear Deformations. By J. A. Newlin and G. W. Trayer. *No.* 200.—Some Problems on the Lift and Rolling Moment of Airplane Wings. By J. R. Scarborough. *No.* 209.—Characteristics of a Single Float Seaplane during Take-off. By J. W. Crowley, Jr., and K. M. Ronan. *No.* 221.—Model Tests with a Systematic Series of 27 Wing Sections at Full Reynolds Number. By Max M. Munk and E. W. Miller. United States National Advisory Committee for Aeronautics, Washington, D.C., U.S.A.

The Official Gazette of the U.S. Patent Office. January 19, 1926. United States Patent Office, Washington, D.C., U.S.A. *Vol.* 342, *No.* 3.

Kilocycle-Meter Conversion Table. Miscellaneous Publication No. 67. *October* 9, 1925. Department of Commerce, Bureau of Standards, Washington, D.C., U.S.A.

The Air Pilot Monthly Supplement. No. 16. *February,* 1926. Air Ministry, Kingsway, London, W.C.2.

The Canadian Patent Office Record. Vol. LIV. No. 4. *January* 26, 1926. The Canadian Patent Office, Ottawa, Canada. Price 25 cents.

Aeronautical Research Committee Reports and Memoranda. No. 981 (*Ae.* 194).—The Design of Pitot-Static Tubes. By E. Ower and F. C. Johansen. August, 1925. H.M. Stationery Office, Kingsway, London, W.C.2. Price 9*d.* net.

Official Gazette of the United States Patent Office. Vol. 342. *No.* 4. *January* 26, 1926.—The United States Patent Office, Washington, D.C., U.S.A.

Abhandlungen aus dem Aerodynamischen Institut an der Technischen Hochschule Aachen, No. 4.—Julius Springer, Linkstr. 23-24, Berlin, W.9. Price 5·10 Reichsmark.

Revista General de Marina. Vol. XCVIII. January, 1926—Ministerio de Marina, Madrid.

Berichte und Abhandlungen der Wissenschaftlichen Gesellscha für Luftfahrt, No. 13.—Neuere Erfahrungen im Bau und Betrieb von Metallflugzeugen. Dornier-Metallbauten G.m.b.H., Friedrichhafen, Germany.

Catalogue.

British Industries Fair : *February* 15-26, 1926.—The Department of Overseas Trade, 35, Old Queen Street, Westminster, London, S.W.1. Price 1*s.*

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AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations : Cyl. = cylinder ; i.c. = internal combustion : m. = motor.
The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

APPLIED FOR IN 1924

Published February 25, 1926

26,505. H. O. SHORT. Construction of thin tubular bodies. (246,598.)

26,729. LORD INVERNAIRN (W. BEARDMORE) and A. E. L. CHORLTON. Aeroplanes. (246,601.)

APPLIED FOR IN 1925

Published February 25, 1926

10,981. LUFTSCHIFFBAU ZEPPELIN GES. Outer envelopes for rigid airships. (240,123.)

FLIGHT

The Aircraft Engineer and Airships

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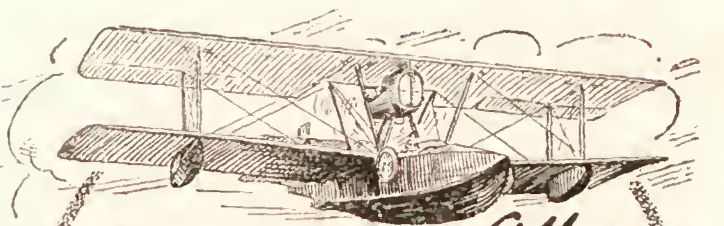

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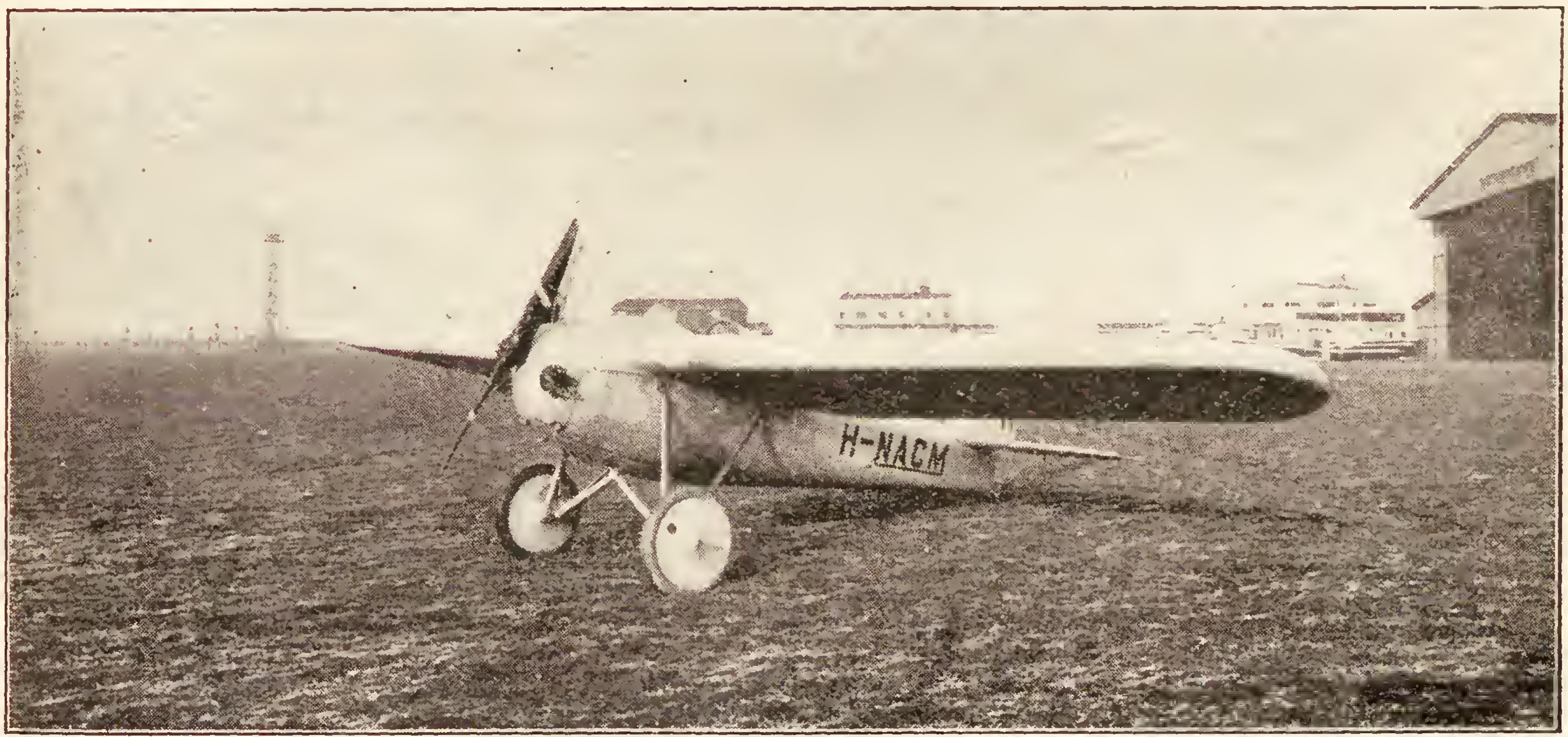

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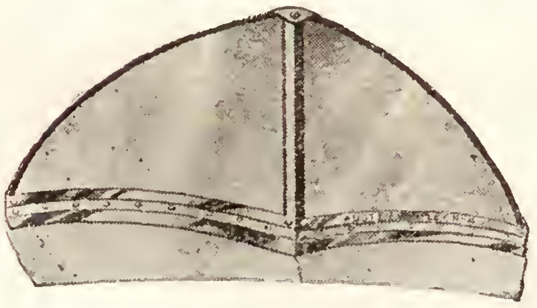

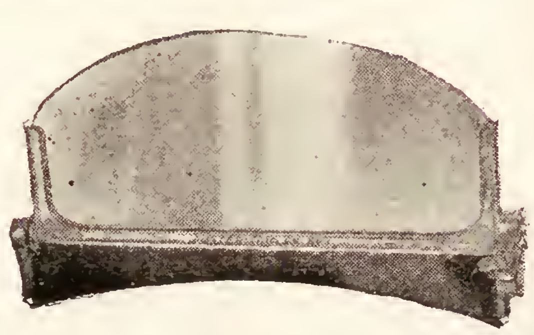

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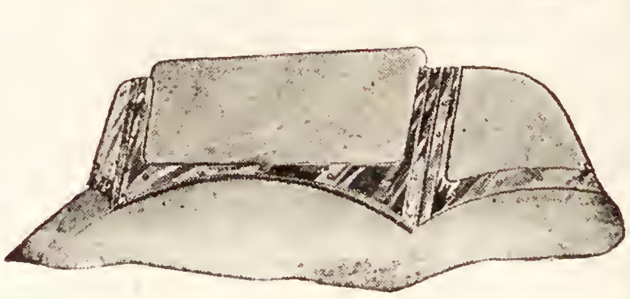

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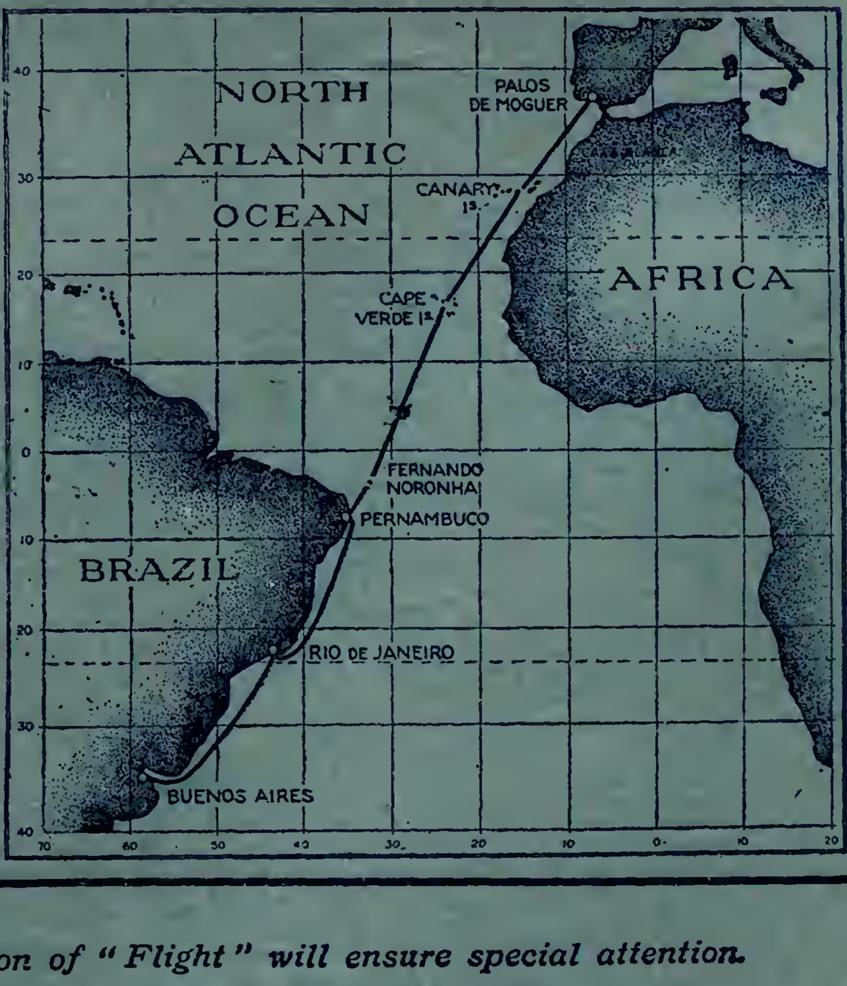

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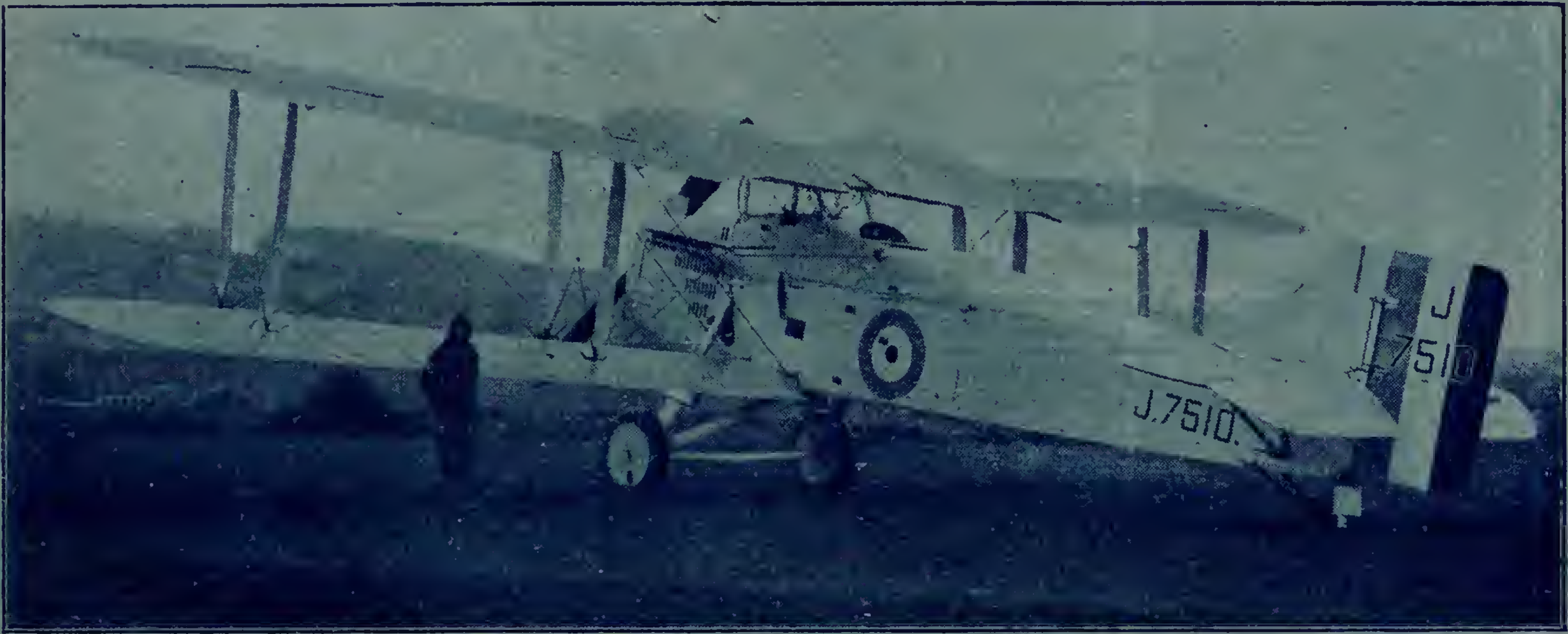

The photograph is of the Yeovil Day Bomber, one of the latest machines built at the Westland Aircraft Works. It marks an important stage in the development of this type of aircraft, possessing among its other features of superiority—a good view for pilot and observer in all directions, stability (for accurate bombing), gravity feed of petrol from tanks in upper plane, and oleo-rubber undercarriage with wide track. It has a Rolls-Royce Condor engine of 670 h.p. with Leitner-Watts metal propeller. The performance of the machine which was built for the Air Ministry, is highly satisfactory.

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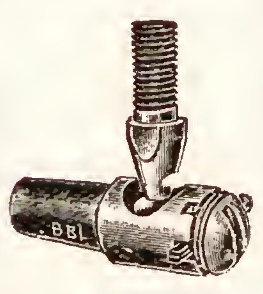

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CONTENTS

Editorial Comment	PAGE
The Air Debate	119
A Modern Bomber. The Hawker "Horsley"	121
The A.D.C. "Nimbus" Engine	122
Light 'Plane Club Doings	126
Correspondence	127
The Hawker "Horsley"	128
Air Estimates	130
Wireless Equipment of the Dornier-Wal Seaplane	133
Royal Air Force	135
R.A.F. Intelligence	135
In Parliament	135
Society of Model Aeronautical Engineers	136
Air Ministry Notices	136

DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list :—

1926	
Mar. 4	**Maj. G. H. Scott. "Development of Airship Mooring," before R.Ae.S.**
Mar. 9	**Mr. O. E. Simmonds, M.A., A.F.R.Ae.S., M.I.Ae.E. "The Development of Civil Marine Aircraft," before Inst.Ae.E.**
Mar. 18	**Mr. A. J. Cobham. "Long-Distance Aeroplane Flights," before R.Ae.S.**
Mar. 22	**Entries close for Gordon Bennett Race.**
Mar. 31	**Entries close for Schneider Cup Race.**
Mar. 31	**Royal Aero Club Annual General Meeting.**
April 8	**Lecture by Marchese de Pinedo, before R.Ae.S.**
April 13	**Mr. S. H. Evans, A.F.R.Ae.S., M.I.Ae.E. "The Performance of Modern Aircraft—with special reference to the Variable Wing," before Inst.Ae.E.**
April 15	**Capt. G. T. R. Hill. "The Tailless Aeroplane," before R.Ae.S.**
April 21	**Inst.Ae.E. visit to Messrs. D. Napier and Son, Acton.**
April 29	**Lieut.-Col. V. C. Richmond. "Results of Recent Airship Flight Tests," before R.Ae.S.**

EDITORIAL COMMENT.

The Air Debate

SO far it is to be feared that the Debate on the Air Estimates in the House of Commons has not produced very much that was new, nor does there appear to be any likelihood of the unsatisfactory position as regards air defence being improved to any extent during the coming financial year. Generally speaking, however, the House appeared dissatisfied with the Estimates, and that may be taken as a healthy sign. It is true that this spirit of dissatisfaction took various forms, and not by any means were all of them based upon the view that the slowing-down of development is a mistake. There was quite a volume of opinion which considered that the halfway measures taken will merely result in spending a good deal of money without securing in return any adequate guarantee of safety in the air. To that extent, therefore, FLIGHT can agree with the Opposition, even if the processes of reasoning have been very dissimilar. As we pointed out not long ago, to insure a house for very much less than it is worth is a waste of money.

A few points from the day's proceedings appear to stand out clearly. One was the "snub" which Mr. Baldwin gave those who would once more attempt to raise the old controversy about separate air services. The Premier's "hint" was plain to the point of bluntness. The Government does not intend to waste any more time in going over a subject which has already been thoroughly thrashed out, and as Mr. Baldwin indicated, it is now in the interests of all three services that this lamentable controversy should cease. Among a superfluity of wordy encounters, this statement, at any rate, stands out clear and unmistakable for every one to read and—let us hope—heed.

Another fact that was brought out by the first stage of the Air Debate was the growing feeling that sooner or later we shall have to come to that Ministry of Defence about which so much has been said and written. Whether or not the time is ripe for such a change may, perhaps, be open to argument, but that it will have to be made at some future date is no longer to be doubted. In the meantime, the suggestion made by Sir Frederick Sykes that a joint executive General Staff may be the solution appears worthy of very serious attention. As Sir Frederick pointed out, the Committee of Imperial Defence has done excellent work in the past, but what is required is a body with executive powers, otherwise we shall merely get good advice but have nobody to see to it that that advice is followed and put into operation.

Captain Guest referred to the subject of continuity of policy, and pointed out that until that was assured there was no hope for a solution of the problems before us. As an instance, he mentioned the days of the Geddes Committee, when the Air Force was whittled down to almost nothing, and then, within six months of that time, the present programme of creating 25 to 30 squadrons for Home Defence was adopted. As Captain Guest put it, a policy is needed which will outlast the precarious life of any one Parliament, a point which Flight years ago advocated, *and it must be consistently pursued.* The present Government has laid down such a policy, but in the present Air Estimates it has failed to follow that policy. The uncertainty is extremely harmful in many ways. It is harmful on the Service side, because until there is some assurance that the Air Service is a permanent and expanding service, parents will necessarily hesitate to let their sons join it, with consequent ill effect on the whole spirit of the Air Force.

Technically the effect of an absence of a clearly-defined and continued policy is, perhaps, even more harmful. Progress in aircraft design is still so rapid that a great deal of research is needed to keep pace with the time. When we say research, we mean practical experimentation, mainly in the matter of constructional problems. Aerodynamic data available at the present time are so vast that the difficulty with which the designer is confronted is not so much that of obtaining fresh information but rather how to gather up and make use of such information as already exists in considerable abundance. On structural problems, however, a good deal remains to be done, and it is obvious that if our aircraft construction firms have no sort of assurance of a continuity of policy, they cannot be expected to risk the financial expenditure necessary for such development work. Rear-Admiral Sueter called attention to this fact during the Debate, and pleaded for as much support as it was possible to give to the aircraft industry, even to the extent of cutting out some of the work at Farnborough and giving it to the industry.

It was, of course, inevitable that some mistaken faddist should get up in the House and plead for the exclusive construction of aircraft in Government establishments. This year the old bogey was raised by Mr. Charleton, who wanted to know why they should not make aeroplanes themselves. Why should they put them out to private firms, who made profits on them? Evidently Mr. Charleton has not taken the trouble to study even elementarily the past history of the Royal Aircraft Establishment, or Royal Aircraft Factory, as it originally was. Other people long before him had the same idea, that it would be cheaper to build aircraft in Government factories, where "the best brains of the country" could be collected together. This system was tried, with the result (which might have been expected) that not only did the aeroplanes produced at "The Factory" cost very much more than privately-constructed machines, but that the machines produced had an inferior performance. That system was short-lived, and definitely proved the fallacy of the argument which Mr. Charleton now, in his ignorance, wishes to revive.

A very important point was raised by Brigadier-General Warner, who drew attention to the hold which foreign aircraft firms were getting in the Dominions, notably in South Africa, where a subsidy of £8,000 is to be paid to a German concern. He suggested that the Air Minister should endeavour to summon a conference of representatives from the various Dominions so that the question of aviation might be discussed and an effort be made to secure that when those countries placed their orders they should place them in this country. He referred to the fact that the German companies were subsidised, and pleaded for support for our own manufacturers to enable them to oppose the foreign competition, an eminently sound and fair plea.

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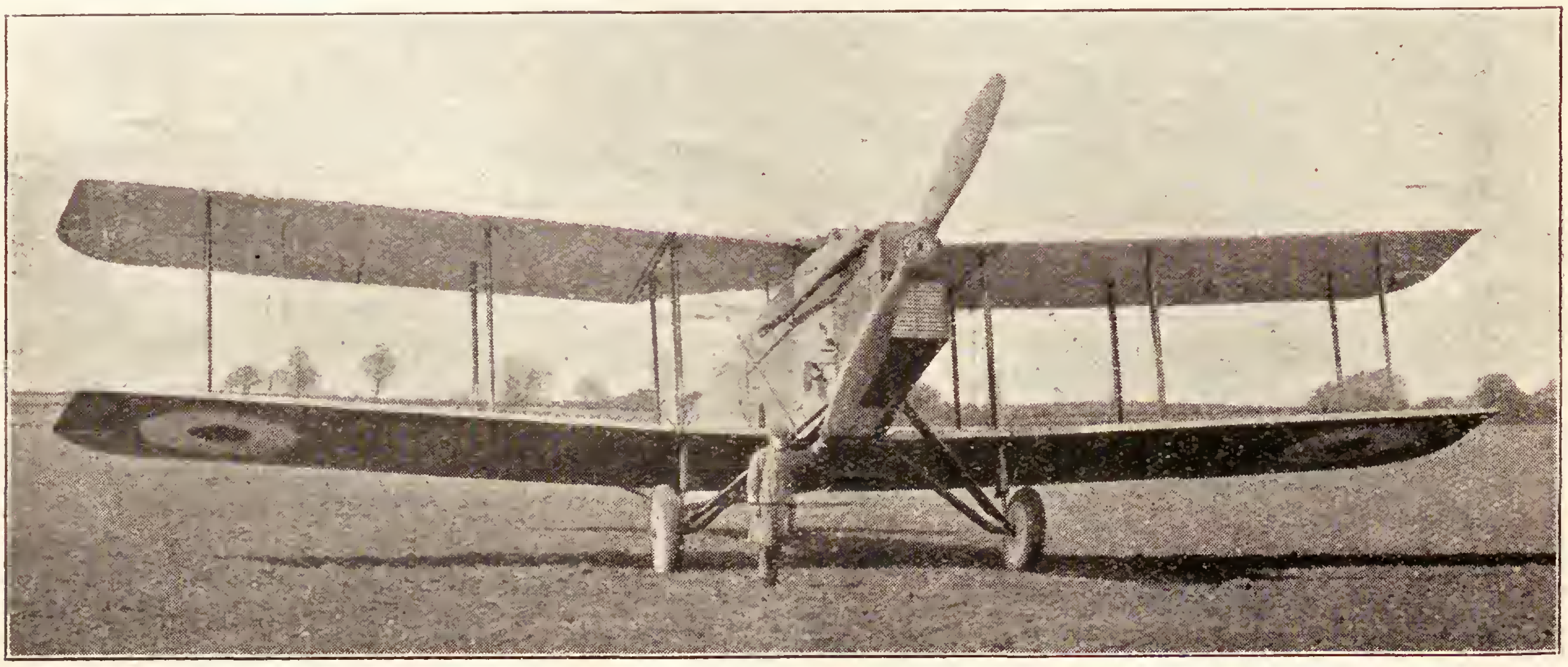
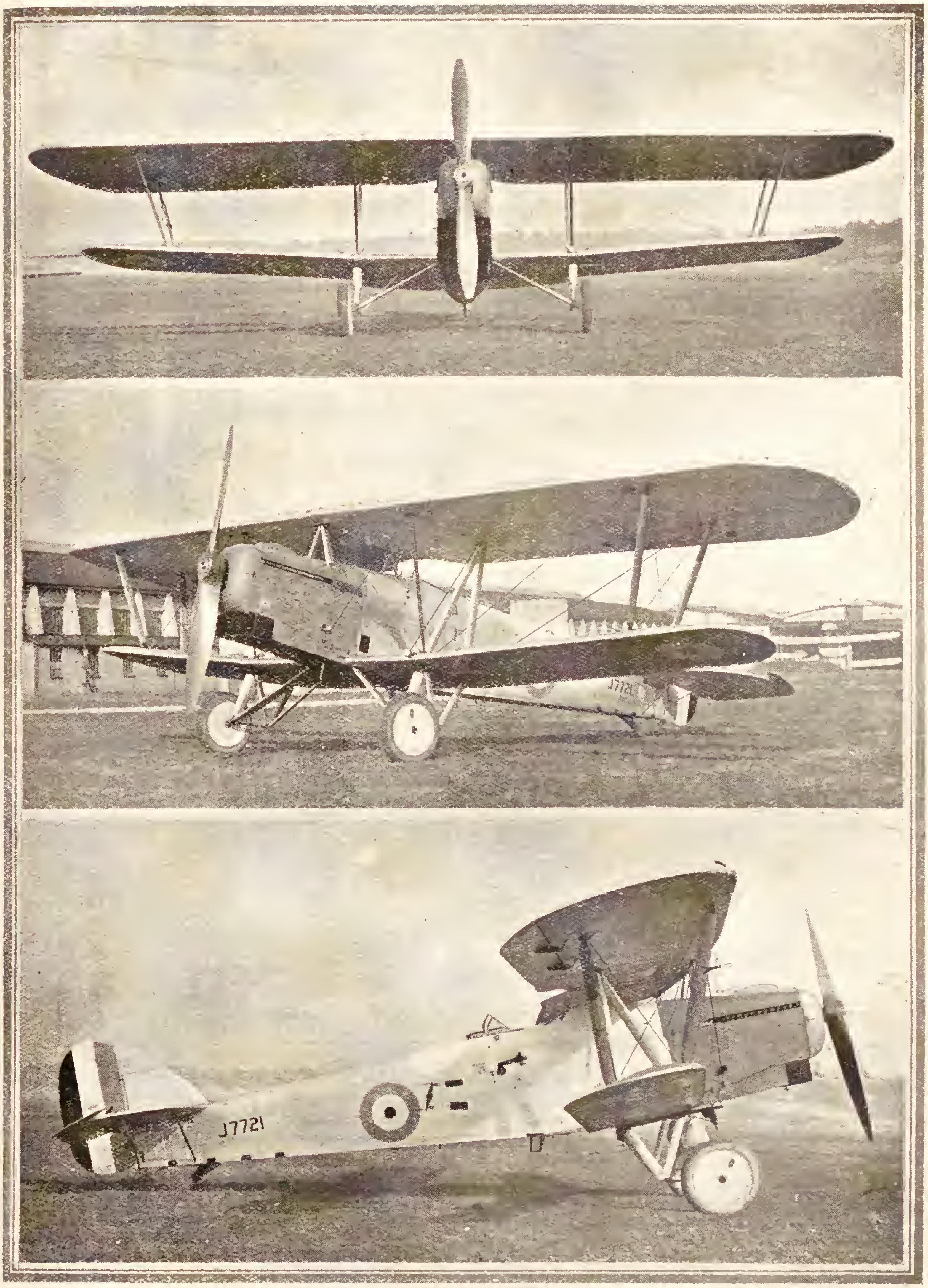


The Bristol "Berkeley" is a Day-Bomber with Rolls-Royce "Condor" Engine. The machine is built entirely of metal, with novel forms of steel construction for main members and Duralumin for minor parts.



["FLIGHT" *Photographs*

A MODERN DAY-BOMBER: The Hawker "Horsley" is fitted with a Rolls-Royce "Condor" Engine of 650 h.p. The machine, it will be seen, is of very "clean" design, and is characterised by a bottom plane considerably smaller in span and chord than the top plane. The cowling around the engine is particularly neat. (See also pages 128 and 129.)

THE A.D.C. "NIMBUS" ENGINE

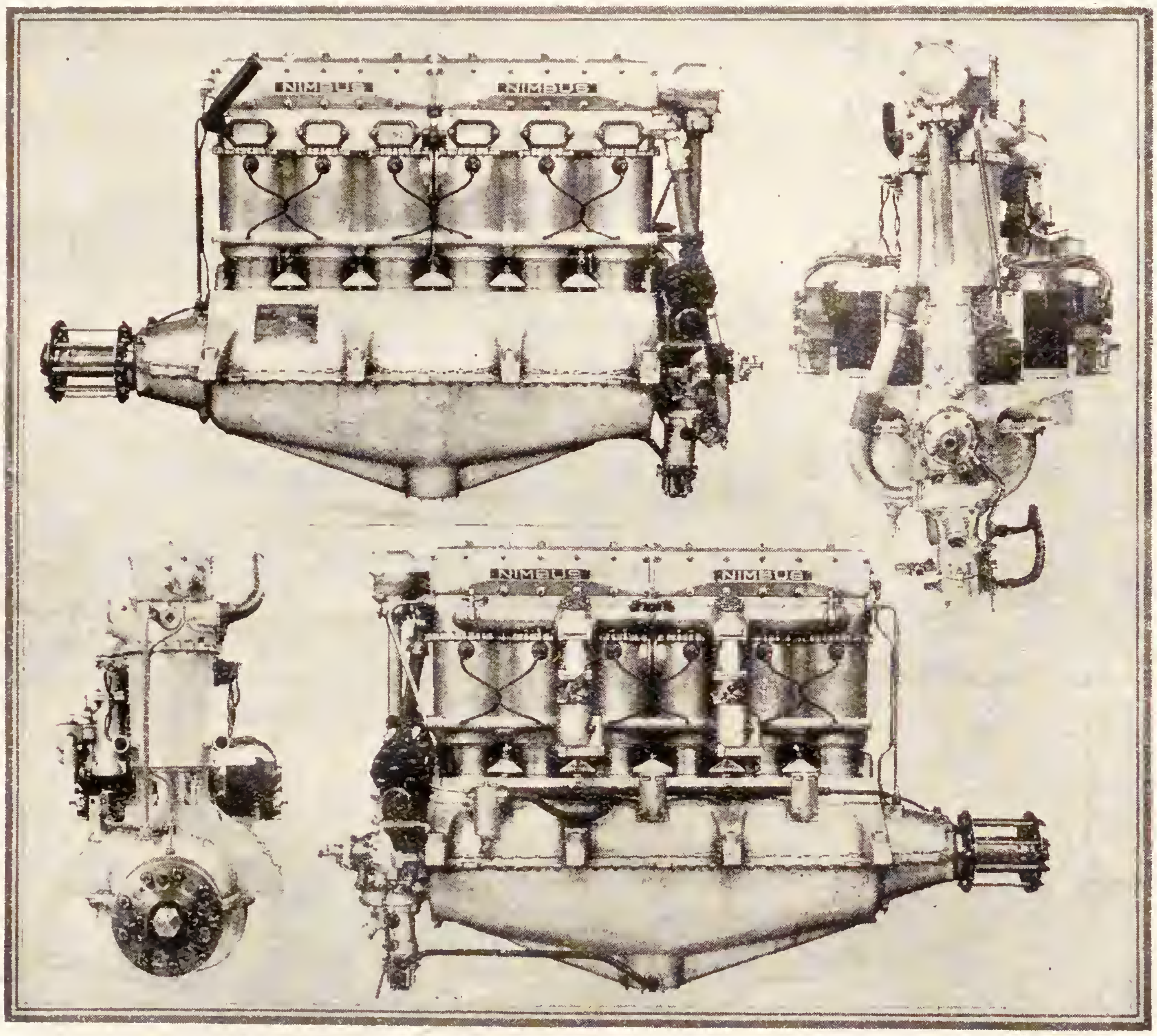
DESIGNED TO FIT STANDARD "PUMA" BEARERS

335 b.h.p. at 1,600 r.p.m.

ALTHOUGH developed from, and employing a certain number of parts of, the Siddeley "Puma" engine, the new A.D.C. "Nimbus" aero engine is in reality to all intents and purposes a different engine. That the "family likeness" remains is not surprising when it is realised that Major Halford, who had a good deal to do with the original design of the B.H.P. engine from which later the "Puma" was evolved, is responsible for the "Nimbus," as produced by A.D.C. Aircraft, Ltd., at their Waddon factories. From the fact that this firm holds large stocks of "Pumas" and spare parts, it was very natural that Major Halford should take this engine as his starting point, so to speak, and should, while producing an engine of very much larger power, make use of such of the original parts as lent themselves to incorporation in the new design. In this manner a great deal of time and money was obviously saved, and the performance of the "Nimbus" seems to indicate that the method has been amply justified, as will be realised when we point out that in spite of an increase in maximum permissible power from 255 b.h.p. at 1,500 r.p.m. to 335 b.h.p. at 1,600 r.p.m., the weight of the engine "dry" is 655 lbs., which is claimed to be approximately 30 lb. lighter than the weight of the original "Puma."

The "Nimbus" is of slightly larger capacity than the "Puma," the cylinder bore having been increased from 145 mm. to 152 mm. The stroke remains the same, *i.e.*, 190 mm., but the compression ratio has been raised to 5·4 : 1. The B.M.E.P. is high, *i.e.*, around 132 lb.

Constructionally, the "Nimbus" differs very considerably from the "Puma" although it is designed to fit the same engine bearers. The steel cylinder liners are screwed into the bottom of the water-jacket blocks, a neat locking arrangement being provided for making a watertight joint. A split locking ring of phosphor bronze is threaded to correspond with the threads on the cylinder liner, a steel strap tightened by a tangential bolt forcing the threads home, and a rubber ring, on being compressed, making a tight joint between cylinder and jacket. The split ring and its locking strap are shown in a sketch.



THE A.D.C. "NIMBUS" AERO ENGINE: Four general views. Note the clean appearance and small frontal area. The projecting magnetos in the gear-end view are exaggerated by perspective, and do not in fact add a great deal to the width. In any case the fuselage has to be a certain width aft of the engine to give cockpit space, and but little advantage would be gained by altering the mounting of the magnetos.

At the top the cylinder liners are secured to the cylinder head castings, which are in the form of aluminium alloy blocks, by the valve seatings, which are of special design and splined on the inside for the special tool used for screwing them home. The water jackets are in the form of two aluminium castings, each block enclosing three cylinders. At the top the water jacket blocks are secured to the cylinder head blocks by a number of bolts, the faces of jackets and

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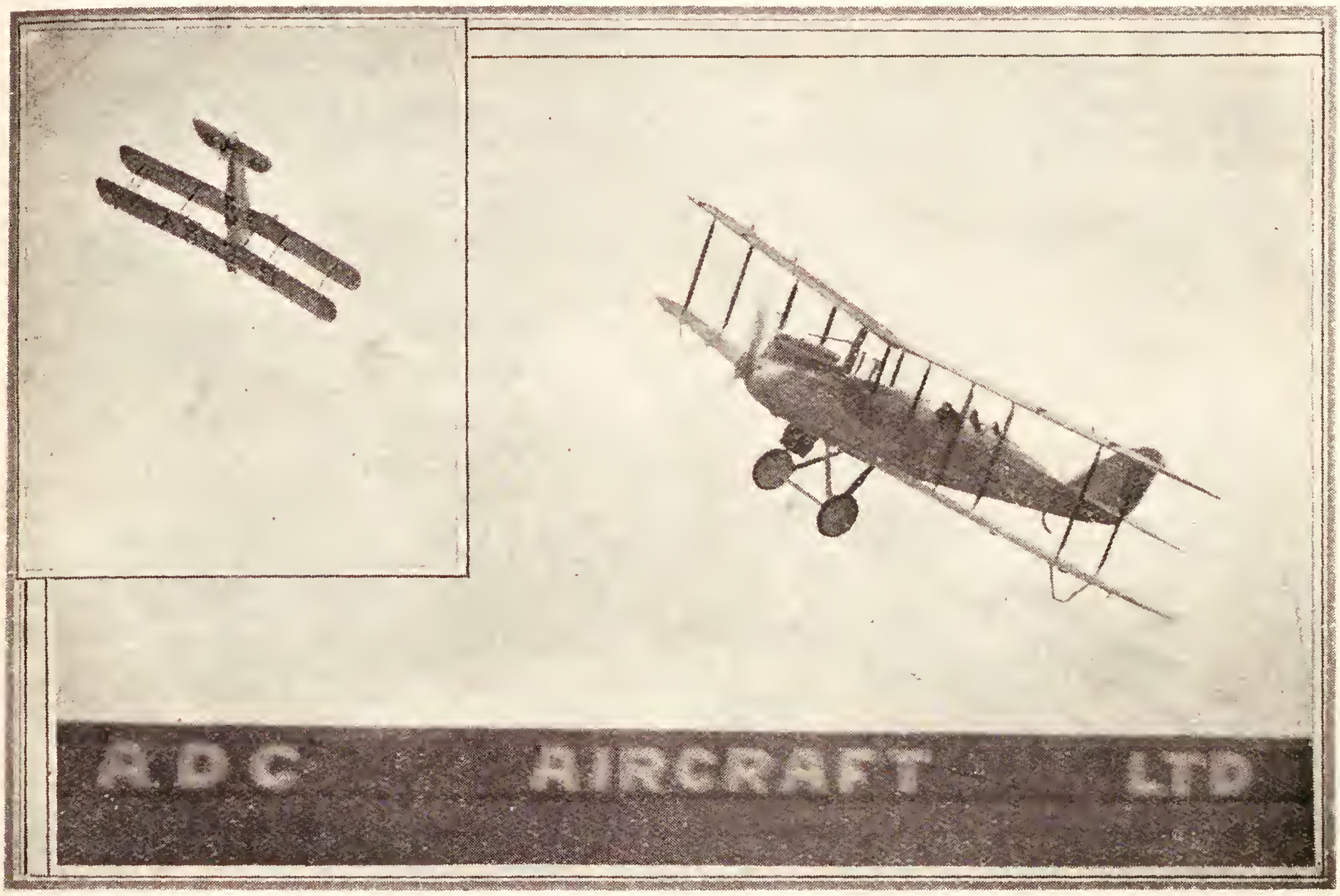
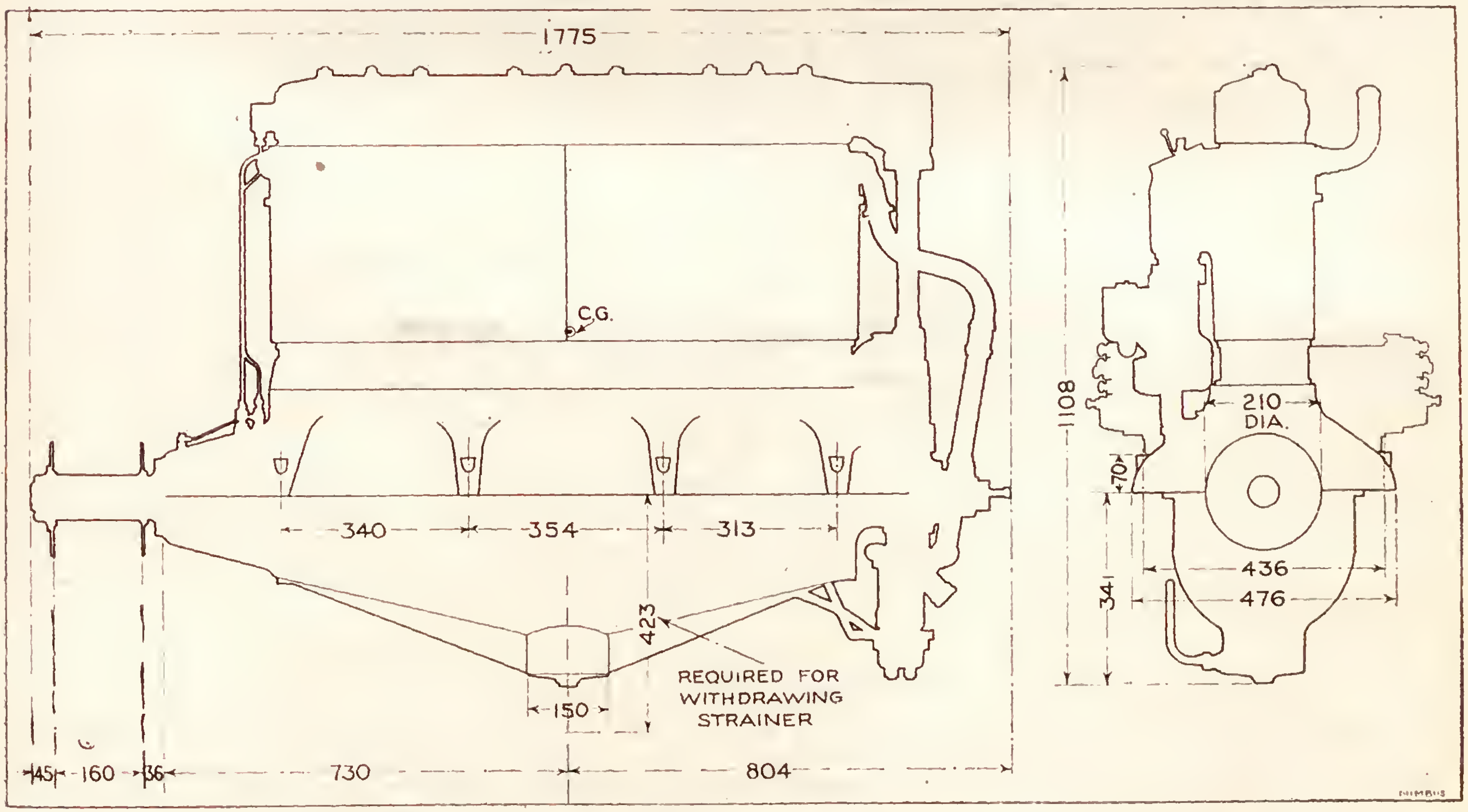
heads being machined to make a tight fit. The cylinder head blocks, as one of our photographs will show, in addition to leaving a large water space around the hottest parts of the engine, are particularly open castings, so that during manufacture, inspection is greatly facilitated and machining operations are reduced to a minimum.

As in the "Puma" there are three valves per cylinder, one large inlet valve and two exhaust valves. The inlet valves



THE "NIMBUS" IN FLIGHT: Mr. Perry flying past the A.D.C. Aircraft works at Croydon Aerodrome, on a D.H.9 fitted with the "Nimbus" engine. Inset, the machine is shown at the top of a loop. With this engine the speed of the D.H.9 3-seater is about 135 m.p.h.

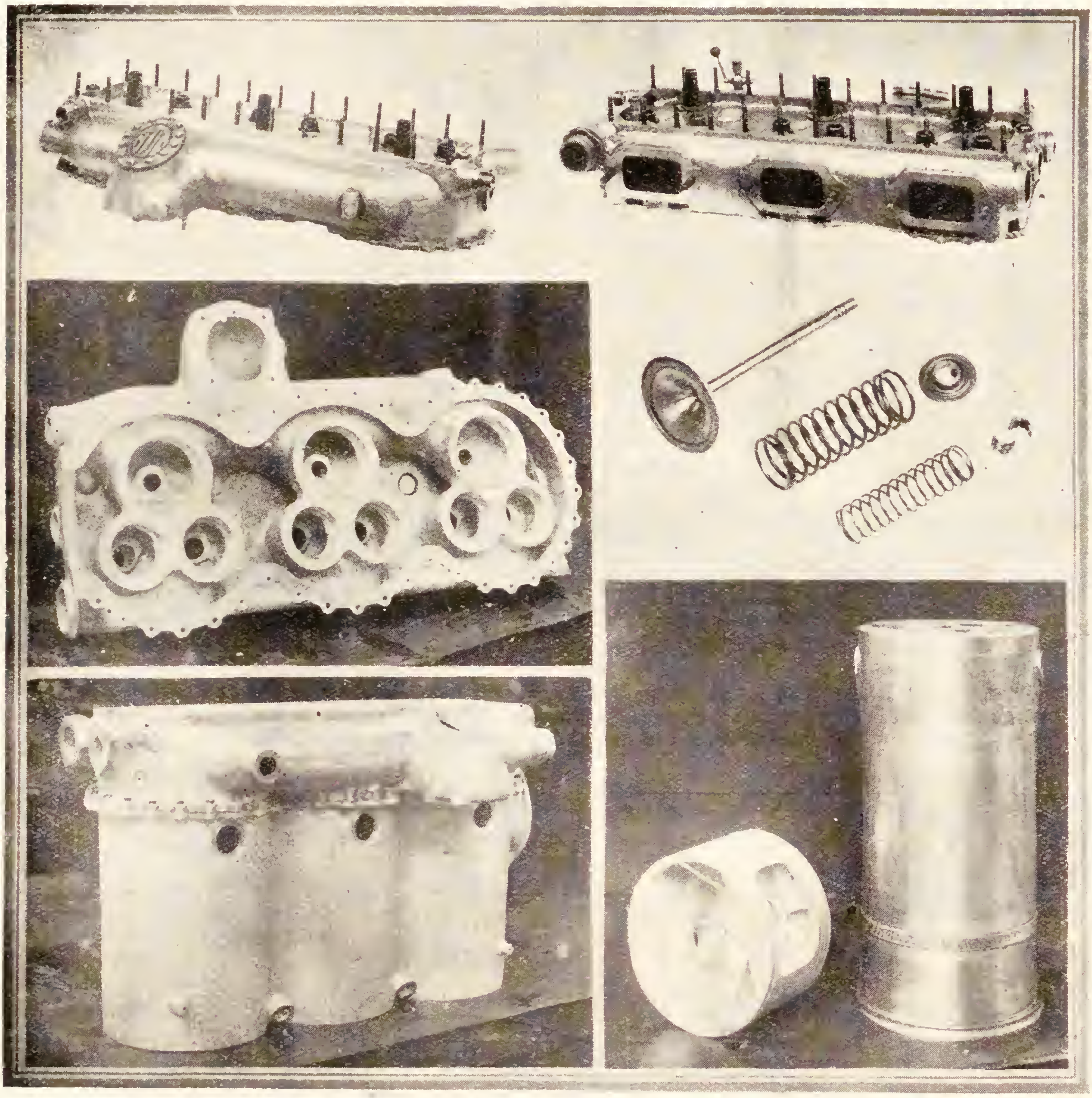


THE "NIMBUS" ENGINE: Installation diagram giving main dimensions.

are operated by short rockers, while the exhaust valves are operated directly from the overhead camshaft. The valve stems have been considerably lengthened so as to give room for longer valve springs, the lift of the valves being rather greater than in the " Puma."

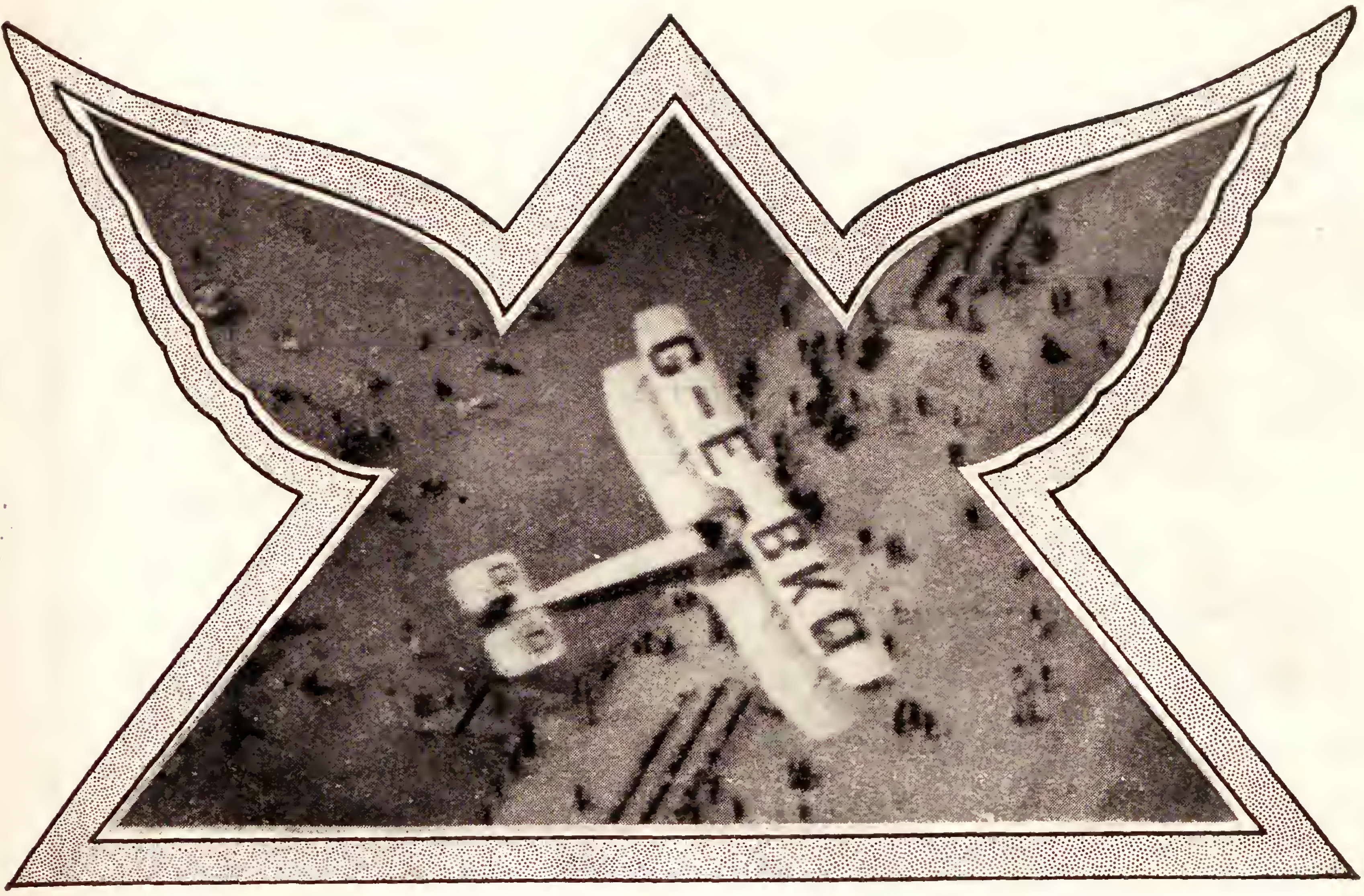
Aluminium alloy pistons of new design are employed, and although they are of larger bore, they are actually lighter than the original. This also applies to other reciprocating parts which, in spite of the greater power developed, are lighter than those of the original engine. The overhead valve gear remains substantially the same as that of the " Puma," as does also the crankshaft. The connecting-rods are of the same type as those of the original engine, but are of slightly different dimensions.

The induction system is a particularly simple one, with two carburettors feeding three cylinders each. In the first "Nimbus" engines built, the carburettors did not bolt directly to the induction manifold, which is cast integral with the cylinder head block, and it was found that in cold weather some slight trouble was experienced with freezing. This was overcome, in the first engines as fitted in a D.H.9, by a sheet aluminium cowling, but in all subsequent " Nimbus" engines the carburettor will be bolted direct to a water-jacketed inlet cast integral with the jacket, and then the need for a special cowling will disappear.



THE A.D.C. " NIMBUS " AERO ENGINE: These photographs show—Above, inlet and exhaust sides of a cylinder head block. On the left, a view inside a cylinder head block, showing the large water spaces surrounding the valves. On the right, an inlet valve with its springs, washers, etc. The photograph in the lower left-hand corner shows a water-jacket block, with its cylinder head block. In future engines the water-jacket casting will have cast with it a water-jacketed inlet. On the right, a steel cylinder liner and its aluminium piston.

At the moment of writing, the " Nimbus " has not been subjected to the actual Air Ministry type tests, but in the course of the makers' own tests, two of these engines have been thoroughly tried out, the runs including two non-stop runs of 10 hours each under Air Ministry supervision. What with tests on the Heenan and Froude brake, the calibrated airscrew, and in actual flight on board a D.H.9, the first two engines have between them completed something like 150 hours' running.



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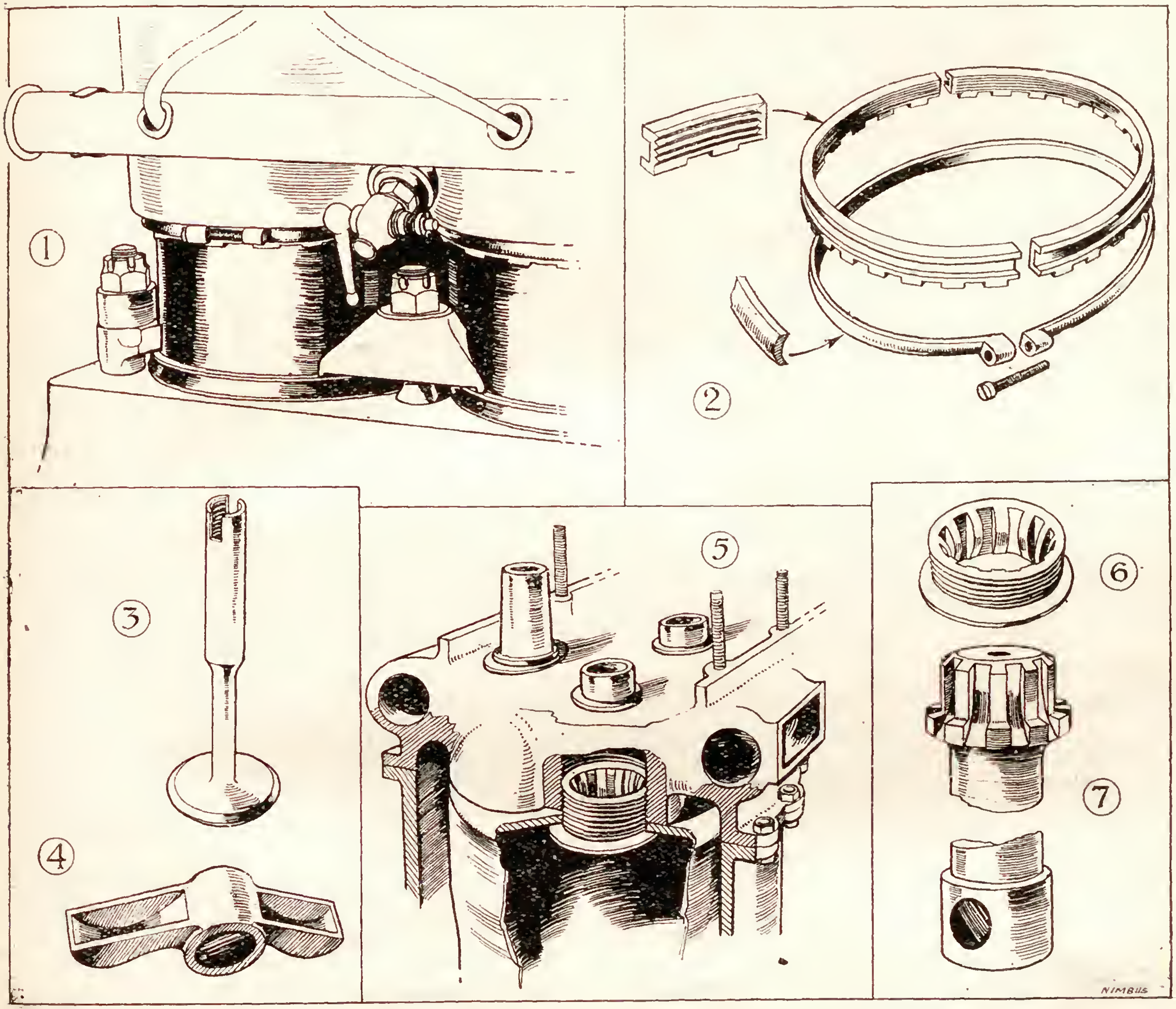
Test Runs

Among the tests carried out at the Waddon Works of A.D.C. Aircraft Ltd., it may be mentioned that on the two 10-hour runs at normal r.p.m. of 1,450 and 90 per cent. of the rated power (270 b.h.p.), the average petrol consumption was 140 pints (79·5 litres) per b.h.p. per hour, which is equivalent to 0·52 pint (0·295 litre) per b.h.p./hour The fuel used was Shell aviation spirit with the addition of 20 per cent. of Benzol.

As being more representative of actual flying conditions, an endurance test of 35 hours (also officially observed) was completed on the calibrated airscrew, without a mechanical failure, at normal r.p.m. and 270 b.h.p. During this test the average petrol consumption worked out at 0·535 pint (0·303 litre) per b.h.p./hour.



THE A.D.C. "NIMBUS" AERO ENGINE: Some constructional details. 1 shows one of the Duralumin dogs holding down the cylinders, while just below the end of the water jacket may be seen the locking strap device of the watertight joint, details of which are shown in 2, in which the castellated split ring is of phosphor bronze and is threaded internally to engage with the threads on the cylinder barrel. 3 shows an exhaust valve with its rocker, and in 5 is indicated diagrammatically the manner of locking the steel liner to the cylinder head aluminium casting by means of the valve seating. The latter is shown in 6, while in 7 is shown the special tool used for locking the valve seating.

Prior to the 20 hours a power curve was officially checked by Air Ministry officials, the results being given in the table at end of this article.

In order to obtain a basis for comparison, a D.H.9 has been tested with full load, both when fitted with the standard "Puma" and with the "Nimbus" engine, when the following results were obtained: Climb to 6,500 ft.: "Puma," 10·3 mins.; "Nimbus," 7·7 mins. To 10,000 ft.: "Puma," 18·8 mins.; "Nimbus," 12 mins.; to 15,000 ft.: "Puma," 42 mins.; "Nimbus," 24 mins. Max. ceiling; "Puma," 15,500 ft.; "Nimbus," 19,500 ft.

The speeds obtained with the two engines were:—Ground level: "Puma," 115 m.p.h.; "Nimbus," 134 m.p.h.; at 10,000 ft.: "Puma," 109·5 m.p.h.; "Nimbus," 121 m.p.h.; at 15,000 ft.: "Puma," 102·5 m.p.h.; "Nimbus," 114 m.p.h.

It will thus be seen that the extra power which Major Halford has succeeded in getting out of the "Nimbus" has a very marked effect upon performance when the engine is fitted in the D.H.9. A similar gain would undoubtedly be obtained in other machines, and the "Nimbus" is a striking proof of the opinion advanced by Commander J. Hunsaker during a lecture at the R.Ae.S., when he stated that although there might not be any great gain in reducing the weight of existing engines, there would be an immediate gain in keeping the engine weight and size the same, but increasing the power. In the "Nimbus" the remarkable features are: the low weight per h.p. (under 2 lb.), the low fuel consumption, the relatively low engine speed (1,450 normal, 1,600 maximum), and the very small frontal area, which latter allows of an engine installation offering a small head resistance.

As to the scope for an engine of this type and power, and bearing in mind that the engine has been designed to be produced cheaply, it is not difficult to imagine types of machines for which it would be extremely useful. One of the most obvious is, of course, the D.H.50, into which the "Nimbus" would fit without alterations to the machine. The extra power should effect a great performance improvement in what is already an excellent machine. Then there is the buestion of 3-engined aeroplanes. A total power of in the neighbourhood of 1,000 h.p. should enable a very useful machine to be produced, and the low frontal area of the "Nimbus" would give the aircraft designer an opportunity to produce a very "clean" machine.

Perhaps a little further out in the future, but still a logical development, is the possibility of combining two banks of "Nimbus" cylinders into a Vee 12-cylinder engine of small frontal area and developing some 650 h.p. to 700 h.p. Such an engine seems to be the type required in the future, and Major Halford should have no great difficulty in producing a double "Nimbus" on these lines. We offer the suggestion for what it is worth. Technically, there does not appear to be any insuperable obstacle in the way. In the meantime, however, there should be a very large demand for the "Nimbus" as it stands, and as the A.D.C. Aircraft Company has recently installed at Waddon machinery for the quantity production of the "Cirrus" engine, it should not be long before the "Nimbus" is being similarly produced in quantities.

Nimbus Engine No. 2. Power Curve.

R.P.M.	Load.			Corrected.		Fuel Consumption.				Oil Temp.		Water Temp.	
						Per Hour.		H.P. Hour.		In.	Out.	In.	Out.
	Lbs.	Kgs.	B.H.P.	B.H.P.	B.M.E.P.	Pts.	Litres.	Pts.	Litres.	Centigrade.		Centigrade.	
1,600	251·5	114	335·5	334·4	131·2	171	97·1	0·51	0·289	54	68	55	78
1,450	255	115·6	308	307·1	132·3	157	89·2	0·509	0·289	60	65	58	75
1,350	257	116·5	288·2	287·3	133·2	147	83·5	0·508	0·288	58	63	60	78
1,250	255	115·6	266	265·1	132·8	135	76·7	0·508	0·288	57	62	62	76
1,150	254·5	115·4	244	243·1	132·3	127	72·16	0·52	0·295	53	60	63	76
1,250	255	115·6	266	265·1	132·8	134	76·1	0·504	0·286	48	58	63	—
1,350	255	115·6	286·5	285·6	132·2	144	81·8	0·502	0·285	50	58	63	75
1,450	255	115·6	308	307·1	132·8	156	88·6	0·506	0·287	50	60	63	74
1,600	250	113·3	333·8	332·9	131·2	170	96·6	0·51	0·289	50	60	63	77

Date 16 11/25. Barometer 29·99 ins. The shop temperature was 59° F.

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LIGHT 'PLANE CLUB DOINGS

London Aeroplane Club

The following members had flying instruction: D. P. H. Esler, Sir John Rhodes, N. Jones, H. R. Presland, R. P. Cooper, A. H. M. Lees, J. Barros, J. S. M. Michie, R. C. Presland, G. N. Howe, E. D. 'E. Moss, L. Anderson, R. Malcolm, S. O. Bradshaw, F. S. Adams, F. C. Elford, D. Kittell, S. D. Durkan, W. E. P. Johnson, E. L. Brough, A. P. Hunt, J. H. Saffery, E. A. Cook, T. H. O. Richardson, C. Quirk, A R. Ogston, K. V. Wright, F. W. Eady, B. B. Tucker.

The following Members flew solo:—Mrs. S. C. Eliott-Lynn, Major Beaumont, G. H. Craig.

There is still only one machine available and the total flying time for the week was 26 hours. The total flying for the month of February was 68 hours (dual 55 hours 35 mins., solo 12 hours, 25 mins.).

The delivery of the new D.H. "Moth" to replace G-EBLU which was written off, is promised for the end of the month. All efforts to acquire another machine to carry on in the meantime have failed. In view of the recent donation from the Petroleum Distributing Companies the London Aeroplane Club has placed an order with the De Havilland Aircraft Co., Ltd., for a third D.H. "Moth" of which delivery is promised in April.

Towards the cost of this machine the following donations have been promised:—Petroleum Distributing Companies, £200; Mr. E. S. Jones, £150; Major K. M. Beaumont, £20; Mr. W. Hay, £20; V. H. Doree, £20; Mrs. S. C. Eliott-Lynn, £10.

Members wishing to assist with donations towards the purchase of this machine are requested to send their names to the Secretary, London Aeroplane Club, 3, Clifford Street, London, W.1.

The Lancashire Aero Club

The weather has permitted flying on most days this week, GEBLV and GEBMQ being the machines flown. Mr. N. T. Stack, who commenced his duties on Wednesday, gave instruction to:—

A. Goodfellow, 20 mins.; C. Agar, 1 hr. 40 mins.; A. Macnair, 1 hr. 25 mins.; M. Lacayo, 10 mins.; B. Smith, 1 hr. 25 mins.; J. Leeming, 1 hr. 15 mins.; S. Harper, 20 mins.; A. Wade, 1 hr. 15 mins.; H. Hardy, 20 mins.; C. Parker, 30 mins.; R. Colley, 15 mins.; L. Slater, 20 mins.; P. Michelson, 15 mins.: T. Wilkinson, 40 mins.; A. Goodyear, 15 mins.; S. Crabtree, 15 mins.; D. Dyson, 20 mins.; R. Williams, 25 mins; D. Tummers, 25 mins.

Mr. Scholes gave dual to the following:—

A. Macnair, 25 mins.; R. Williams, 10 mins.; F. Davison, 30 mins.; S. Crabtree, 30 mins.; J. Leeming, 40 mins.

Mr. Cantrill gave A. Goodyear 20 mins. dual.

Solo flights by A. Goodfellow, 40 mins; M. Lacayo, 40 mins.; T. Cantrill, 15 mins.

Tests occupied 1 hr. Total dual 14 hrs. 15 mins. Total solo, 1 hr. 35 mins. Total time flown, 16 hrs. 50 mins.

The Newcastle-upon-Tyne Aero Club

Week ending February 28.—Total time flown by members, 16 hrs. 15 mins., made up as follows: Dual, 12 hrs. 30 mins.; solo, 1 hr. 30 mins.; pilot members, 1 hr. 45 mins.; passenger, 30 mins.

Dual with Maj. Packman was carried out by Mrs. Marcks, Miss Leathart, Messrs. MacMillan, Shaw, Wardill, L. Smith, Saudilands, Twine, C. Thompson, W. Todd, J. H. Johnstone and R. Whitfield.

Solo, Miss Leathart and Mr. MacMillan.

Pilot members solo: Mr. R. N. Thompson, Mr. N. S. Todd, all of whom carried passengers.

Mrs. W. B. Ellis was the only passenger carried during the week, going up with Maj. Packman, originally for 15 mins., but requesting at the expiration of this time, a further ¼ hr., and on being asked by Maj. Packman if she would like a loop, replied, "Yes, one," which she had, much to the surprise of her son and grandson, who were on the ground. Mrs. Ellis stated on landing that she had thoroughly enjoyed it.

The total number of flights during the month of February was 129, and the hours flown 68¼, all but six hours had been completed on LX. Ten members have been taught to fly and six have now obtained their certificates. As the club has had to operate on one machine only during the past two months, it is not possible for members who have reached the solo stage to be launched so as to enable them to carry out sufficient practice to "pass out," two or more machines being absolutely necessary to allow of pilots being trained up to the obtaining of their licences. Thanks to the generosity of the petrol distributing firms, and local promises of assistance, it appears that better times are ahead, however.

On Wednesday Mr. MacMillan was launched solo, putting up a very good performance during three flights, though one of these was the cause of some alarm, the wind changing completely round from east to west, and it was feared that Mr. MacMillan had not noticed it. His attention was drawn to the matter by one of the many signals used, and he made a perfect landing.

Miss C. R. Leathart went off solo after a short dual flight and flew round very nicely, but misjudged her landing the machine turning over on touching the ground. The hard-working LX, on which all instruction has been carried out to date, will now have a rest, though it is hoped that the repairs can be carried out at the aerodrome in order to save time.

It had been arranged that Maj. Packman should go to Stag Lane to bring up LY on Wednesday night, which he did. A very successful journey from London to Newcastle was accomplished, in spite of very bad weather conditions, the visibility being bad throughout the flight, necessitating flying at between 200 and 300 ft. the whole way. He arrived safely, having made good time, and bringing messages from Commander Perrin from Stag Lane, the Lord Mayor of Leeds and Prof. Brodetski, Chairman of the Yorkshire Club, these letters being despatched to the city by motor-cyclist on arrival, it being too late for the Lord Mayor of Newcastle and the Chairman of the club to be present at the aerodrome on account of engagements.

Sunday brought forth glorious sunshine, and one of the most interesting days since the beginning of flying at Cramlington was enjoyed by a large number of members.

A large number of hours and much energy had been spent during the week in efforts to start the Blackburne engine of Mr. Ellis's Gnospelius "Gull," without success. Mr. Lancaster Parker had been invited to come up to fly the machine for the first time. Mr. Ellis had been anxious to fly it himself but the obstinate engine prevented this being done. Mr. Parker's presence must have impressed the engine, for it started obediently when he took charge of the operations.

Running off straight from the tac-mac everyone one was surprised to see the machine take off after what was considered to be quite a short run, as it was understood that he meant to taxi round the aerodrome to run up the engine, which has been thoroughly overhauled, and many of the parts are new. He made one large circuit and a perfect landing. During the period of the flight Mr. Ellis went off to get his flying kit, and others went for cameras. Maj. Packman asked if he might have a flight soon, as he had a number of pupils waiting for dual, and Mr. Ellis sportingly told him to take it right away. This he did, handling the machine well, and turned to return to the aerodrome, but suddenly the nose of the machine went down and a splutter of the engine was heard. It appeared that he had gone into a small pine wood, but this was not so, as a perfect landing had been made in a field beyond it. The cause being that he had taken off with about a teaspoonful of petrol, the tank being perfectly dry. It took 14 members to push the "Gull" over the fields and lift it over hedges back to the aerodrome, and they found it very hard work, though the machine was empty, and everyone has great respect for the wonderful little 5-6 Blackburne engine now. Considering that it would be necessary to remove the wings to get it home, Maj. Packman flew over with Mr. Brown as passenger, and the latter dropped a bag containing the necessary tools near to the machine, and as the "bomber" was subjected to some leg-pulling regarding his aim, it is feared that there will be some difficulty in obtaining volunteers to salvage future machines if tools are to be dropped, as he will doubtless wish to prove that he can find his target next time.

Please note change of address of registered office, which is now at Cramlington Aerodrome, Northumberland.

All communications and parcels sent per Parcel Post should be addressed as above. Goods sent by rail should be addressed to Cramlington Station, L.N.E.R. Telephone, Cramlington 9.

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Civil Marine Aircraft

We would remind our readers that it is on Tuesday of next week, March 9, that Mr. O. E. Simmonds is reading his paper on "The Development of Civil Marine Aircraft," before the Institution of Aeronautical Engineers. Mr. Simmonds has collected a good deal of very valuable information relating to the component weights of a variety of types, information that has not hitherto been available, and his paper should thus be of more than ordinary interest. The meeting will be held in the Lecture Room of the Junior Institution of Engineers, 39, Victoria Street, and will commence at 6.30 p.m.

CORRESPONDENCE

The Editor does not hold himself responsible for opinions expressed by correspondents. The names and addresses of the writers, not necessarily for publication must in all cases accompany letters intended for insertion in these columns.

SLOTTED CONTROL

[**2125**]. I have read Mr. F. Courtney's article in your issue of the 26th inst., with more amusement than apprehension, especially in regard to his remarks on slot control.

I think, in fairness to all concerned, Mr. Courtney should first explain how he arrived at the conclusion that slot control is of no value, when he has only flown the machine for an infinitesimal period.

According to reports seen in the press, he is of opinion that no new machine or arrangement can be tested and thoroughly reported on unless numerous routine tests such as taxying, short hops, and then extended flights are carried out. I think I am right in stating—if not, I apologise—that he will not test a new machine for any firm unless these tests are allowed.

The only conclusion one can arrive at is that Mr. Courtney is grossly exaggerating the "technique" of test flying.

Mr. Courtney has had a considerable amount of experience in flying, including bad landings and stalling, so should be able to judge the dangers of these manœuvres when there is insufficient control.

Now for his condemnation of the "slotted control," which is carried out in a purely non-technical manner. If he had taken the trouble of reading and at the same time digesting the various reports issued on the subject, he would have a more elastic mind.

In the first case, he states that the rolling is very large and sudden with a positive yaw. It would have been wise to state whether this is in relation to a positive or negative roll. It may interest him to know that the suddenness of the roll and direction of yaw can be arranged for any degree by suitable arrangement of slot length.

Another point he makes light of is the case of control above the stall, and goes on to state that control below the stall is more important. I am of opinion, and no doubt others will agree with me, to obtain control beyond the stall and control below the stall will be all that is desired.

It is all very well saying that commencement of stalls are not accidental but deliberate. It comes as cold comfort to the unfortunate pilot who has stalled and would have got away with it if he had been able to keep his machine on an even keel and pancake on to the ground at a velocity not exceeding 16 to 20 ft.-secs.

It is well known that when ailerons are used above the stall the down aileron has the effect of producing a very high value of drag, and, in consequence, reducing the speed of the wing on that side, which is the opposite effect to that desired.

The "slot control" produces a very high rolling moment and at the same time reduces the drag on the side of the wing with the aileron down, making all motions occur in the direction of turn.

As regards the point that a large rudder will have the same effect, this is not denied; at the same time, the other side of the question must be considered. In quite a number of accidents the cause can be put down to the negligent use of the rudder and executing a flat turn; the nose falls, and the pilot endeavours to pull it up with the stick, so completing a manœuvre over which he has no control.

If larger rudders are fitted, they will have to be no heavier than the existing size as regards hinge moment. In consequence, if they are used negligently, the time in producing a spin, as explained above, will be considerably decreased, due to the much larger yawing moment. The reply will probably be that opposite rudder will check the spin. Unfortunately, the first half-turn of a spin means a considerable loss in height, and if the machine is anything within 50 ft. of the ground the result will be disastrous.

The illustration of a machine executing a "falling leaf" is a stunt, and it is only with the utmost care that this can be executed to avoid a considerable loss of height between each movement of the rudder.

From the designer's point of view exceptionally large rudders would add to the problems of design. In the case of the "Avro" with large rudder, some of the grounding angle was forfeited to accommodate it. Its run after touching the ground must be considerably increased, which is a bad enough snag in itself. To get over this difficulty, the rudder must go on top of the fuselage, then increased torsion enters into it and an increase in weight to take the loads.

As regards the weight of slot for "slot control," the amount is negligible and is more than justified by the amount of control obtained. As for its being a "gadget," "Rome was not built in a day," and Mr. Courtney's acquaintance was with a first attempt at solving the problem of control at slow speeds, which was fitted to an "Avro," mainly for the purpose of confirming wind-tunnel results. Needless to say, these were more than confirmed.

Later tests, when published, will go to show that his remarks in regard to "slot control" are fallacious.

Mr. Courtney will, perhaps, consider his remark of the "psychological effect" in stalling to the "Auto-Gyro" and its effect on common or garden pilots who would be asked to fly it at its present stage of progress.

These few remarks are for the pilot in this category, and not for the expert, who needs "naught" of these gadgets to bring him safely to earth. At the same time, may I remind Mr. Courtney that aeronautics is still a young science and its furtherance is not helped by *argumentum ad ignorantiam*.

R. Reynolds

Cricklewood.
February 27, 1926.

ENGINE FAILURE AND STALLING

[**2126**] Permit me to congratulate you on the excellent beginning made by you in the Aircraft Engineer. An open forum for technical discussion has long been needed and such an article as that by Captain Courtney on "Stalled Flight and Control" is a very valuable beginning.

He will forgive me if I say that I think neither he nor the Aeronautical Research Committee have pushed their studies to a logical conclusion. Both have stopped thinking too soon.

I have read more than a couple of hundred reports of stalling accidents, almost all fatal. The history is nearly always the same. Engine failure, generally on getting off, followed by an attempt to land in a field just out of reach, or by an attempted turn back into the aerodrome.

The engine failure is the root of the difficulty; it creates the circumstances accepted by both Capt. Courtney and the A.Re.C. as leading to stalling accidents. I have never heard of a stalling accident to a machine the engine of which was, beyond question, functioning satisfactorily.

To me the only conclusion is that for machines operating overland, enough engines must be fitted for the aircraft to climb with one broken down. Following that, adopt the safeguards in design and training recommended by Capt. Courtney.

I would make two reservations in respect of the above opinion: (1) it does not apply to seaplanes because they do not have to turn back into an aerodrome, and do not have to reach a given field; (2) in a certain number of military and racing machines, the advantages to be gained justify the use of single-engined types. This latter condition may always hold for the single-seater fighter, but I see signs of it dying out for two-seaters and larger types of war aircraft. On civil types my opinion seems to be already borne out by current practice.

B. Thomson, A.F.R.Ae.S., *late Capt. R.A.F.*

Cowes, I.W.
February 27, 1926.

◆ ◆ ◆ ◆

Royal Air Force Club

The annual general meeting of the Royal Air Force Club will take place at 5 p.m. on March 10, at the Club premises, 128, Piccadilly, W. 1.

Imperial Airways—Sunday Services Resumed

Imperial Airways, Ltd., announce that the 12 o'clock service to and from Paris on Sundays will recommence on March 7 until further notice, and will be duplicated or triplicated as necessary. Also, owing to the continued falling of the French franc they will, in conjunction with the French Air Union Co., increase the fares from Paris to London (as from March 1) to 700 frcs. single and 1,300 frcs. return. There is, however, no alteration in the London-Paris fares, which stand at £5 5s. single and £10 return.

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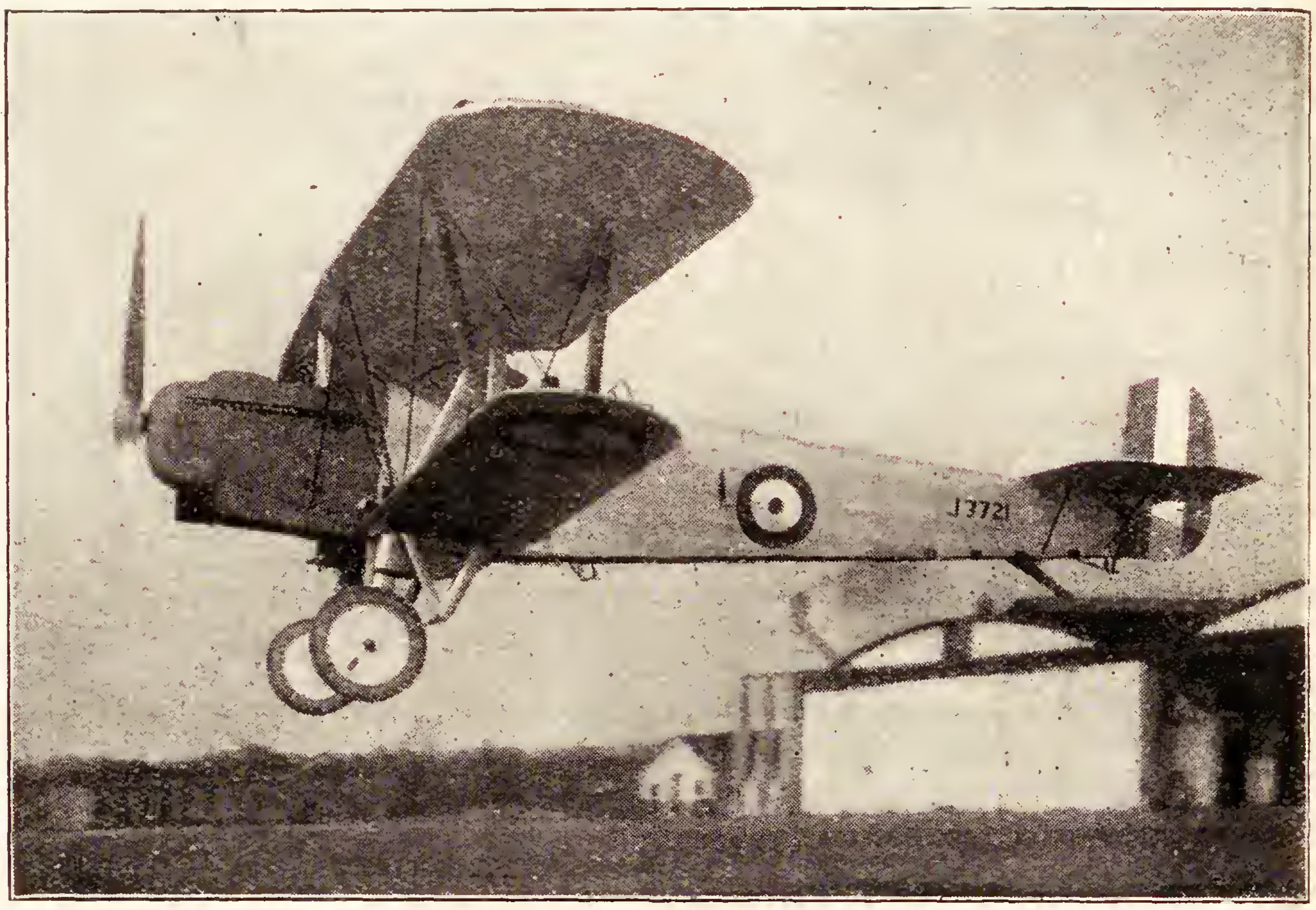
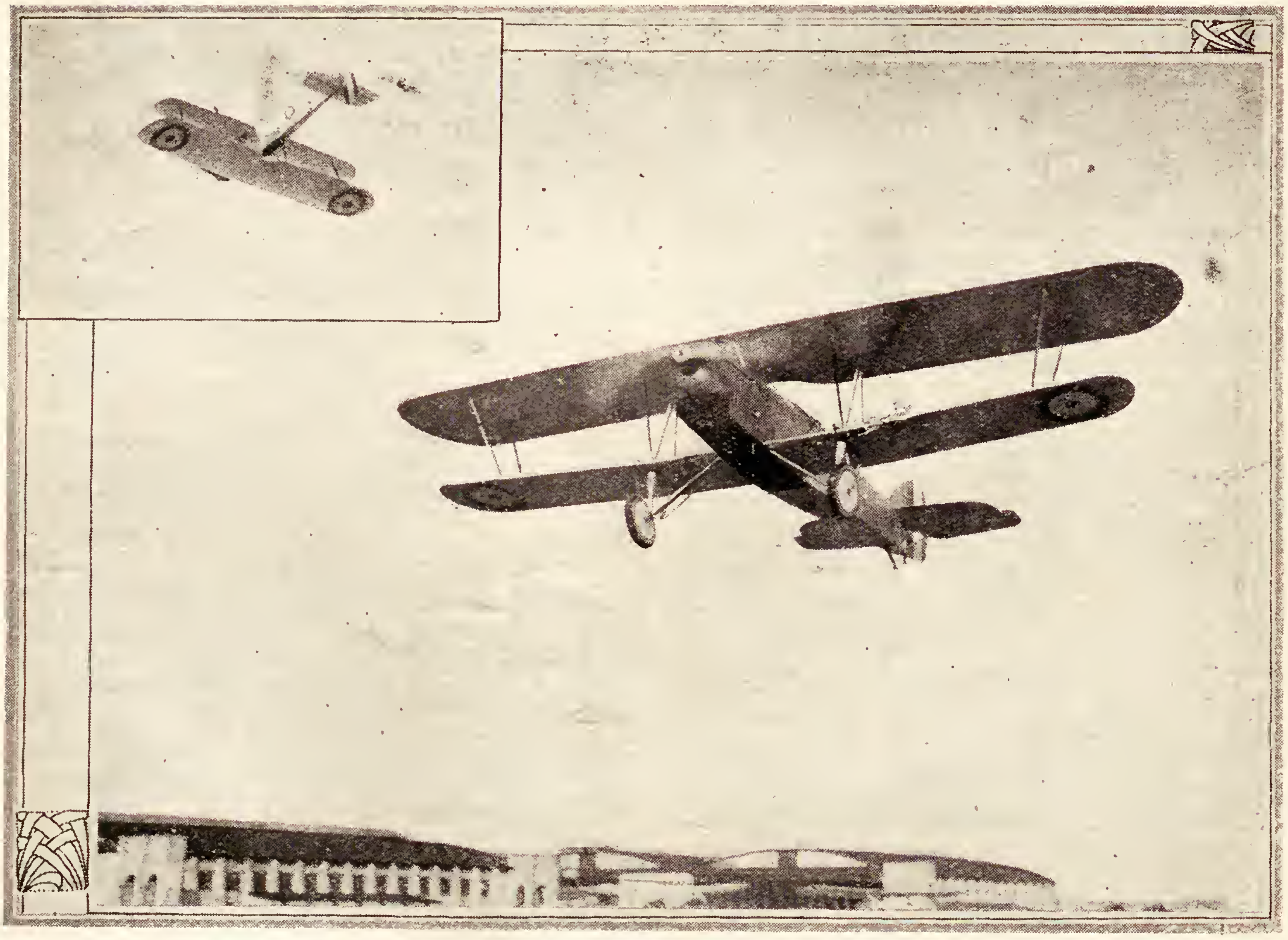


The "Fly-Past": The Hawker "Horsley," with Rolls-Royce "Condor" engine, crossing Brooklands at speed, piloted by Flight-Lieut Bulman.

FLIGHT *Photograph.*



[FLIGHT *Photographs.*

AT FULL SPEED: The Hawker "Horsley" with Rolls-Royce "Condor" engine, piloted by Flight-Lieut. Bulman, flying past the hangars at Brooklands. The inset shows the machine at the top of a loop, an evolution which this astonishing machine seems to perform with the greatest ease. (See also pages 121 and 129.)

The "Lions'" Share!

Commenting on the wonderful
flight by Major Franco from
Spain to Buenos Aires, *Flight*,
in its issue of Feb. 4, says:—

"That the 'Lions' did their duty and did it well is amply evident: and it is a testimony to their stamina that when the propeller of the rear engine was damaged by the rough seas, the last part of the flight was completed with only one of the engines at work. This must necessarily have meant that after having been run for some 33 hours (a good deal of the time at or near maximum power) one of the "Lions" was then run to its full capacity for the last 100 miles or so, yet apparently it was none the worse for its gruelling test."

This flight by Major Franco—6259 miles in 59 hours 35 mins. flying—has broken records in more than one direction.

Never before has a machine or engine to start to cross the South Atlantic, successfully completed its journey.

Never before has such a long flight been completed in such a series of long non-stop journeys.

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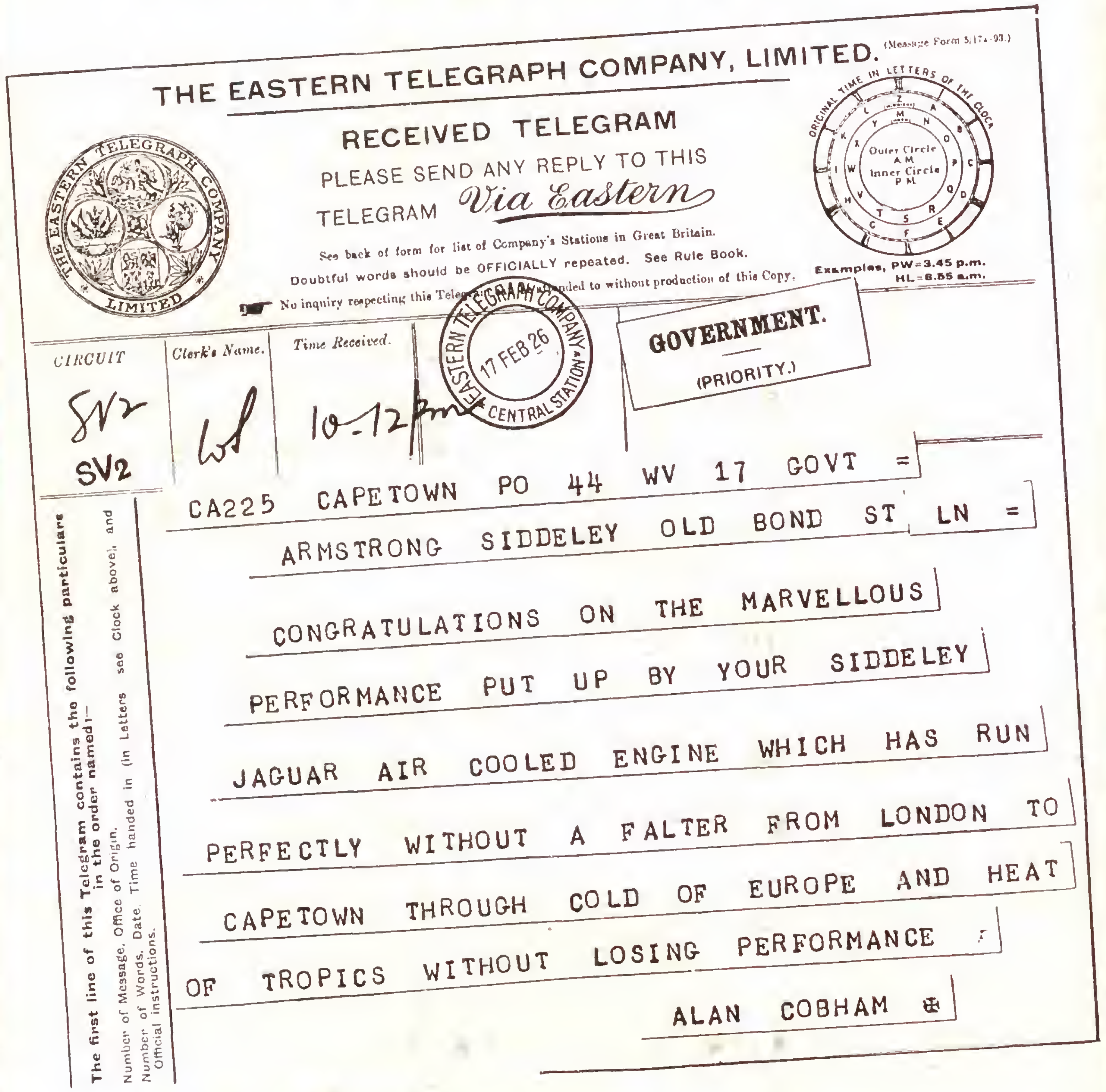
Alan Cobham's Cable.



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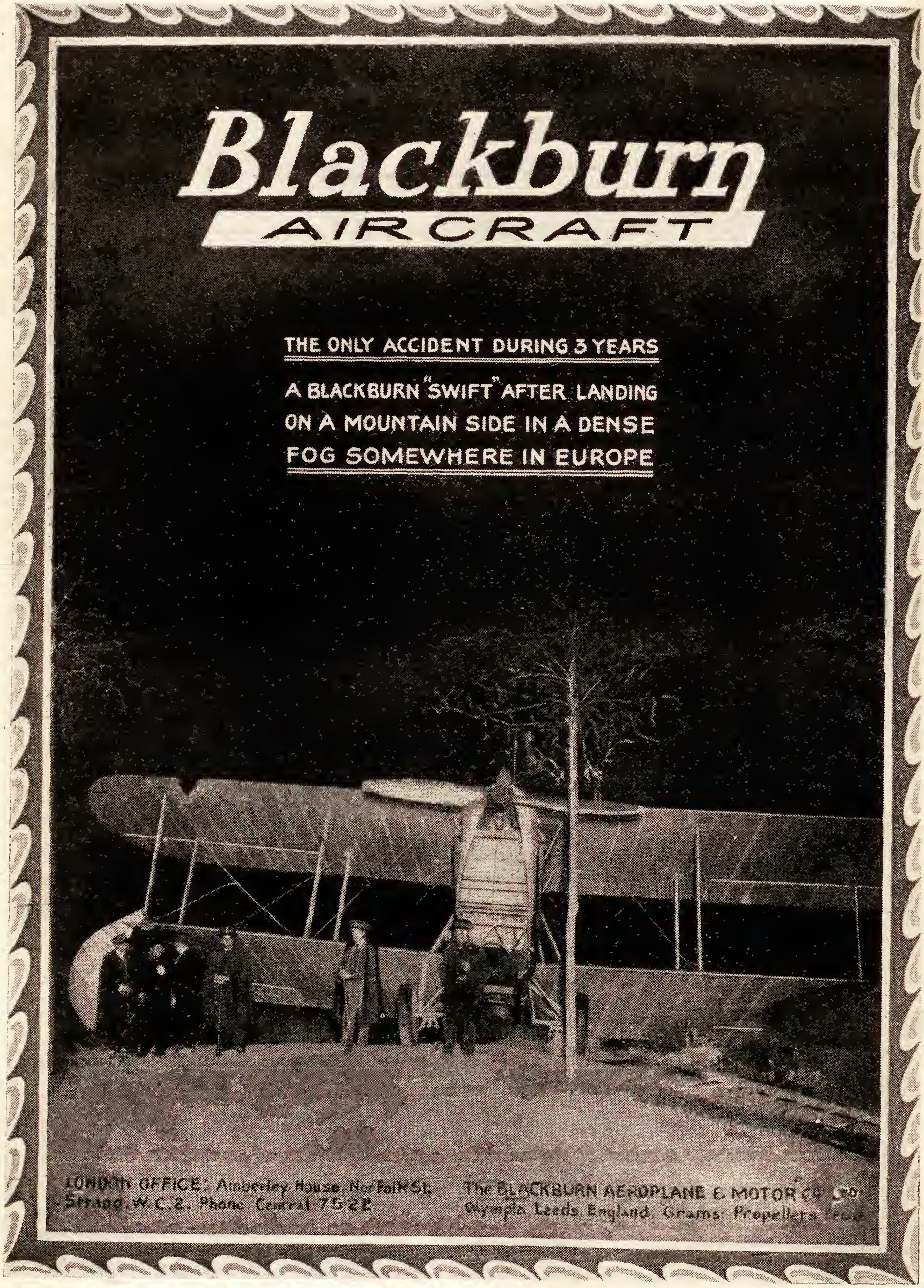

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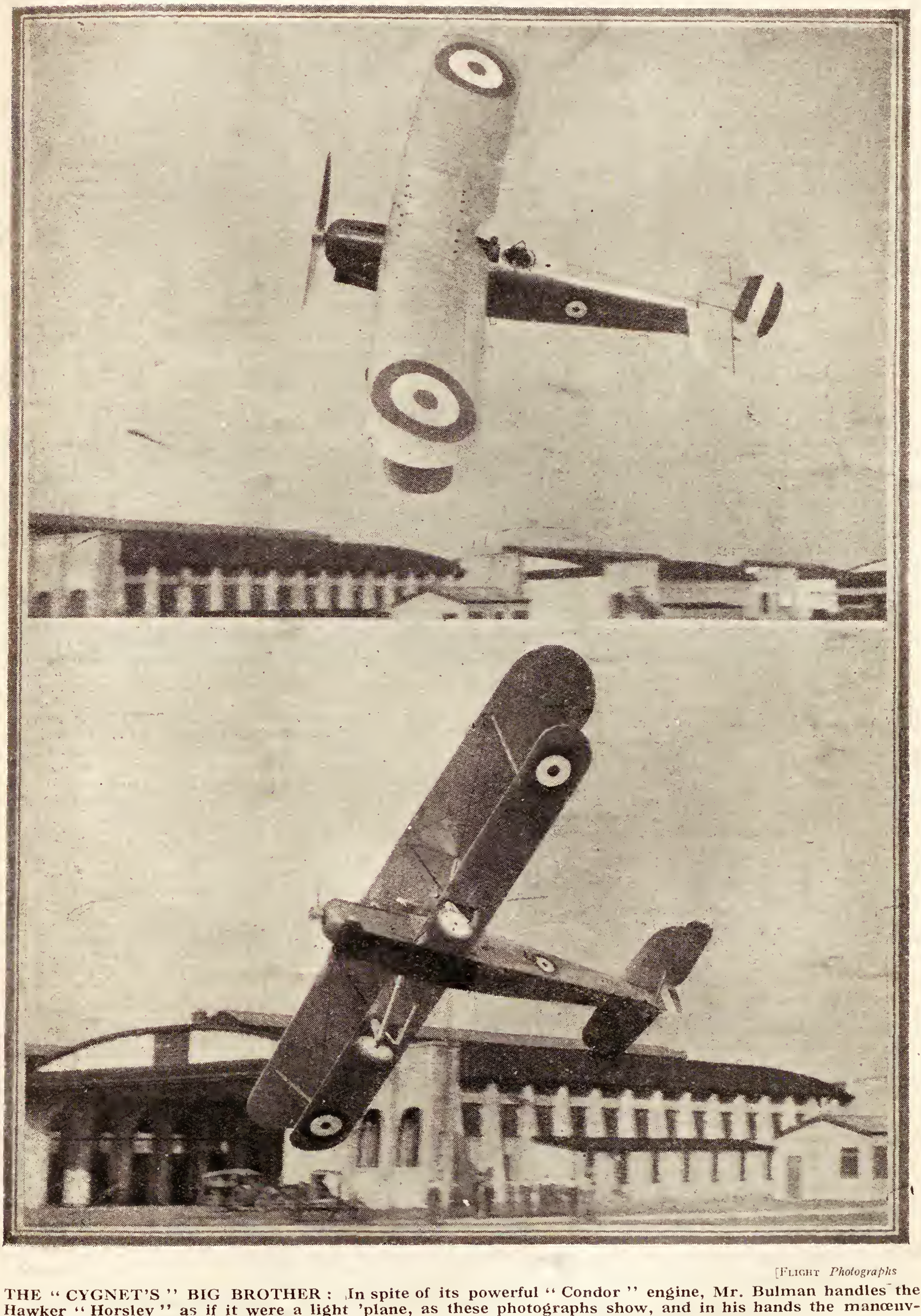

[Flight *Photographs*

THE "CYGNET'S" BIG BROTHER: In spite of its powerful "Condor" engine, Mr. Bulman handles the Hawker "Horsley" as if it were a light 'plane, as these photographs show, and in his hands the manœuvrability of the machine is extremely good. (See also pages 121 and 128.)

THE AIR ESTIMATES

Sir Samuel Hoare's Speech in the Commons

A noteworthy "introduction" to the debate on the Air Estimates in the House of Commons on February 25 was the statement by Mr. Baldwin (in reply to a question by Mr. Ramsay MacDonald) in which he said that the Government had no intention of reopening the question of a separate Air Arm and Air Ministry. It was, he said, their intention to follow the organisation of Imperial defence on the existing basis of three co-equal services. It was in the interests of the fighting services that all controversy should now cease, and he definitely announced the conviction of the Government that the way to ensure the co-operation indispensable to efficiency and economy lay in combined action between the three services through the machinery of the Committee of Imperial Defence and the recently constituted Chiefs of Staffs.

In his opening remarks Sir Samuel Hoare, Secretary of State for Air, referring to the Prime Minister's statement, said that he was glad that it had been made, for he was sure that the longer the idea remained that the question was an open one the worse it was for the relations between the three Services and the more difficult it was for the Air Ministry and the Air Force to carry out their already difficult duties.

Having pointed out that the Estimates did not differ in any marked degree from those of last year, Sir Samuel said that the small net increase in the Estimates was to be explained by the new developments that they had undertaken during the last few years and particularly by the additional squadrons that they had recently formed. The increase would have been substantially greater, he said, if he had not been able with the loyal help of the Air Ministry and the Air Staff, and the advice of the Colwyn Committee, to make numerous economies over the whole field of air administration. They have had to cut out of the Estimates several items that they should have liked to include, but they have all felt that they must loyally take their share in the effort to keep down public expenditure. "I maintain" said Sir Samuel, "that we have held the balance not unsuccessfully between the urgent need of air development and the insistent demand for public economy."

Home Defence

Dealing with the question of Home Defence he said that first and foremost there was our paramount duty for the defence of these shores against air attack—a duty that had been recognised by the action of successive Governments in approving the programme for a Home Defence Force of 52 squadrons. Of these 25 were already formed, and 3 more would be added in the course of the financial year. Thus whilst in 1922 there were only 3 squadrons available for Home Defence at the end of 1927 there would be 28. Although we were today, setting aside Russia, the second greatest air power in the world, we would still be in an inferiority of somewhat less than 1 to 2 as compared with the total strength of our nearest neighbour. This could be allowed to continue, however friendly might be our relations with our neighbours. Therefore our programme of Home Defence accepted by Government after Government remained intact, the only question before the House being whether or not they were justified in spreading the expenditure over a somewhat longer period than originally intended.

The Aircraft Industry

Regarding the question as to whether they were not running the risk of crippling the aircraft industry by slowing down the programme, Sir Samuel said: "I do not wish to underrate the difficulties of the industry. They are very great. They are, I am afraid, inherent in the position of an industry that depends almost exclusively upon the orders of a single Government Department. I do not believe that there is any other important British industry that is so exclusively dependent upon a single Government Department. This dependence means that the industry is the victim of changes of policy, and of changes of policy carried out not only by the British Government but also by foreign governments. For it is obvious that if foreign governments decide upon a reduction of air armaments, there will undoubtedly be reactions upon the whole field of our military air policy. I am afraid that it cannot be denied that the fewer orders the Air Ministry gives to the British firms, the weaker these firms become for potential expansion in the future. I can assure the House that I have not ignored this fact in preparing my Estimates."

"Whilst, however, I do not deny the fact that the slowing down of the programme reacts upon the industry, I am convinced that there is no cause for the extreme alarm that many people feel. Even with the slowing down of the programme, the amount paid out to the industry in the course of the year will be the third largest amount paid to it since the war, and three and a half millions more than was being paid to it when I came to the Air Ministry in 1922. These facts should be kept in mind when alarmists speak of ruin and disaster. So far as employment is concerned, I shall do everything in my power so to spread the orders as to keep as many key men as possible in the various firms."

He further proposed to help the British aircraft industry to obtain markets abroad, by relaxing the restrictions placed by the Air Ministry upon the sale of new types.

Coming to the other principles of our air policy, he said he would not at the moment say anything in detail about the provisions of air force for the Navy, the Army and the Empire Garrisons, but he would say in passing that, so far as the Fleet Air Arm was concerned, it was fully equipped with post-war types, and had the most efficient flying personnel of any Fleet Air Arm in the world. As to the squadrons with the Army, he was glad to think that the co-operation between the forces became closer every year; and that the lessons of the Army manœuvres would be of great value to the two Services.

Empire Air Routes

After brief reference to the air work in the Empire—Iraq and India—Sir Samuel dealt with the question of Empire Air Routes, the military and civil sides. He referred to the long distance Empire flights (by the R.A.F.), the Cairo-Nigeria and the Cairo-Cape Town, started last year, and which would be followed by others. Upon the civil side, he said they were hoping to make a definite start with the aeroplane route to India during the course of the year.

Airships

"Our airship programme," proceeded Sir Samuel, "is not less important from the point of view of Empire air routes. There again we may look forward to substantial advances during the next twelve months. We have had a busy and eventful year with research and experiment, both model and full-scale. Hon. members will remember with satisfaction the fine achievement of the crew of the R.33, and will be glad to hear that we obtained both from the eventful flight of last Easter and the other flights that the airship has made, most valuable data for the design of the new ships. Indeed, I do not think that the Government have ever embarked upon a great experiment with so fixed a determination to avail themselves of all the lessons of science and experience and to leave nothing to chance. Our airship programme is of such vital importance in the development of Empire communications, to say nothing of its value in the field of Empire defence, that I am particularly glad to state that, whilst certain items of the cost are being spread over a somewhat longer period than was originally contemplated, no substantial change is being made in it. I do not wish to tie myself down to exact dates for the completion of so difficult an experiment, but I have made no secret of my view that, as things are, the two airships should, before the normal life of this Parliament comes to an end, have brought London and Bombay nearer together than were London and Edinburgh a century ago."

The Training of an Air People

"I come to the last and by far the most important objective that we have in mind, the creation of an instructed public opinion upon air questions and an expansion of air knowledge and air practice in a much wider circle than at present exists. Honourable Members have described this effort as the effort to create an air sense, without which we shall never become an air people. This is a fine-sounding phrase, and I wish to give the House an idea of the way in which we are trying to translate it into action. . . . We are trying to extend air knowledge in three directions. We are trying, in the first place, to extend the knowledge of air defence beyond the limited ranks of the Air Force by the creation of Auxiliary and Special Reserve squadrons near our great industrial centres. This experiment has now started, and is, so far as I can see, developing satisfactorily. In 1926–27 we propose to carry it a stage further. We are not forcing the pace, as we wish from the very outset to get the right type of officer and the right type of man."

Secondly, continued Sir Samuel, there was the effort they were making to bring our air programme into much closer contact with the science of the country, and particularly with

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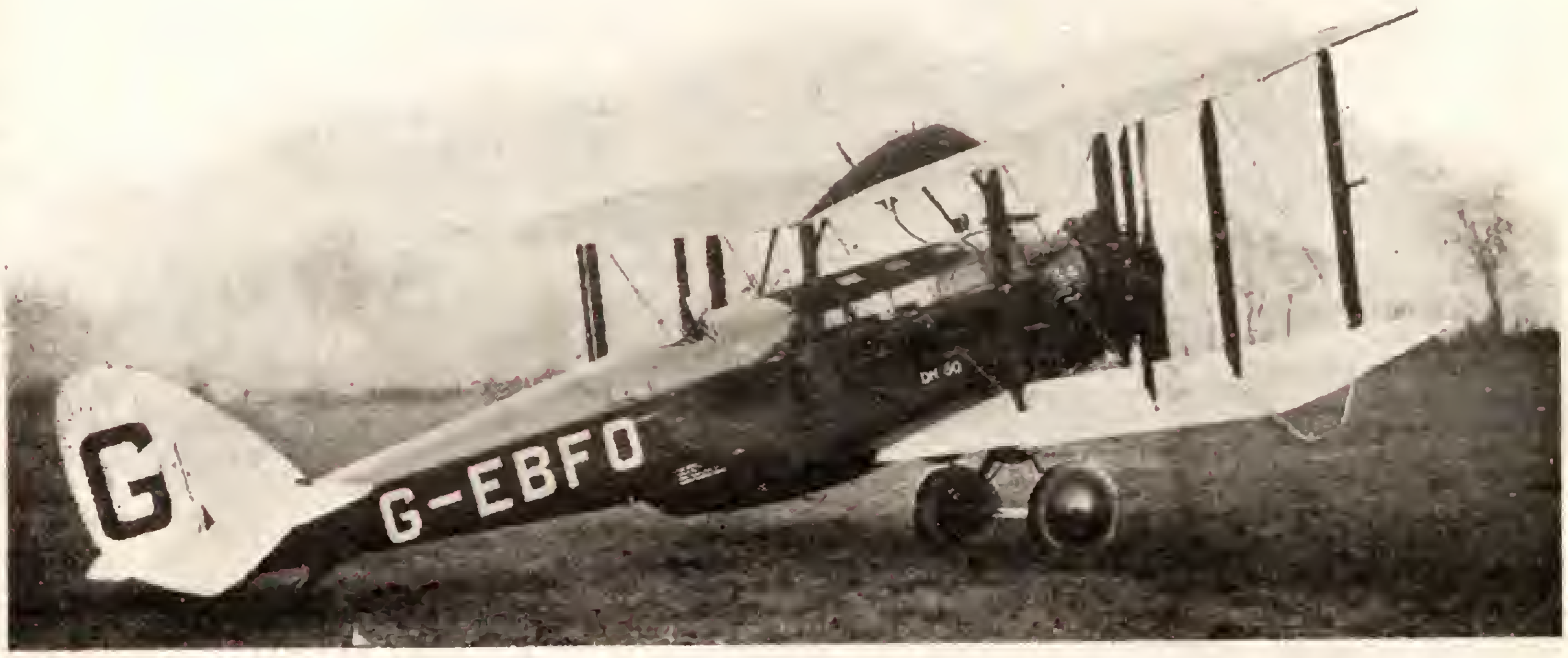

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650 × 65	78	178.	44.45	132/46
"	79	178.	44.45	Central
"	100	178.	38.09	132/46
"	101	178.	31.75	132/46
600 × 75	21	160.	28.	Central
"	186	120.	34.92	Central
"	190	150.	38.09	Central
700 × 75	78	178.	44.45	132/46
"	79	178.	44.45	Central
"	100	178.	38.09	132/46
"	101	178.	31.75	132/46
700 × 100	77	178.	44.45	132/46
"	92	185.	55.	135/50
"	95	185.	55.	Central
"	99	178	38.89	132/46
700 × 100	112	150.	38.09	Central
"	176	178.	44.45	Central
"	179	178.	55.	132/46
650 × 125	119	178.	55.	132/46
"	147	178.	55.	Central
"	188	120.	34.92	Central
750 × 125	77	178.	44.45	132/46
"	92	185.	55.	135/50
"	95	185.	55.	Central
"	99	178.	38.89	132/46
"	112	150.	38.09	Central
"	176	178.	44.45	Central
"	179	178.	55.	132/46
800 × 150	161*	185.	55.	135/50
"	162*	185.	55.	Central
"	163*	185.	66.67	135/50
"	169†	185.	55.	135/50
"	177	185.	55.	135/50
"	183	185.	55.	Central
"	211*	185.	60.32	135/50
1000 × 150	167	185.	55.	125/60
"	174	250.	80.	Central
"	182	185.	55.	Central
1000 × 150	187	220.	66.67	Central
"	201	185.	60.32	125/60
"	210	185.	60.32	Central
1000 × 180	148	220	80.	Central
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"	155	220.	66.67	Central
"	166	185.	55.	125/60
900 × 200	107	185.	55.	Central
"	108	185.	55.	125/60
"	128	220.	66.67	Central
"	137	250.	80.	Central
"	157	185.	80.	Central
"	202	185.	60.32	Central
1100 × 220	134	220.	66.67	Central
"	136	250.	80.	Central
975 × 225	192	185.	60.32	Central
1250 × 250	133	250.	80.	Central
"	154	304.8	101.6	Central
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the science at the Universities. We had reached a most important point in the history of aviation, and they needed not only the able efforts of the Air Ministry, but also the help of scientists outside. It was for this reason that he had carried through a reorganisation of their Research Department which, under a newly-created Director of Scientific Research, would be able to concentrate their efforts more directly upon scientific research. For example, Sir Samuel referred to the problems of the control and stability of the aeroplane, of metal construction, of supercharged engines, and of the " Auto-Giro."

Lastly, there was the attempt they were making to bring aviation within the reach of the ordinary citizen. Five light aeroplane clubs had already been started, and already had been joined by about 1,000 members. He believed that this movement would greatly extend in the future and that, so far as the ensuing year was concerned, would be given a stimulus by the light aeroplane competition in the autumn, for which the *Daily Mail* had offered substantial prizes.

They were also trying to bring the Service into closer connection with the industrial life of the country; the Institute of Mechanical Engineers had already decided to regard training in the Air Force as an alternative qualification for the entry of an associate.

Co-operation between the Services

Concluding, Sir Samuel pointed out that it was a big programme—one that needed the concentrated efforts of everyone connected with it. He hoped that they would have no more sudden changes of Government policy, and that the controversies over the existence of an independent Air Force would also cease. The Air Force had established itself in the life of the nation, and year by year it was increasing in efficiency and esprit de corps. It existed for the purpose of meeting a definite and very urgent national need, and Government after Government and committee of inquiry after committee of inquiry had without exception decided that the organisation of an independent Ministry and Air Force was best suited to our particular needs.

" This indeed," said Sir Samuel, " is my last word to the House, and it is, perhaps, not the least important of any that I have said. Not only must our programme carry out the principles that I have tried to describe, but it must be so applied as to ensure the closest possible co-operation between all three Services. So far as my advisers and I are concerned, we shall make every effort to ensure this co-operation, and to combine with the keenness of a new Force the fine traditions and varied experience of the two older Services."

THE DEBATE

A very lengthy debate followed the introductory remarks of the Air Minister, but did not generally speaking, bring out very much that was new, and it is not therefore proposed in the following report of the debate to do other than touch very briefly upon certain points which have appeared to us to have an important bearing upon the subject of the Air Estimates.

Major Attlee said the most interesting thing in the Air Minister's speech was the revelation which it gave of his outlook and point of view with regard to the whole question of defence. It seemed to him that what the Air Minister really meant by a home defence force was a counter-attacking force of such size as would counterbalance some hostile attacking force, for an air force was not really a defence force at all. He felt himself moved to ask the Government what was the potential menace against which they were arming, and complained that in the Estimates there was no echo of the Locarno spirit. He called attention to the duplication in the Navy, Army, and Air Force Estimates of such services as directorate of operations and intelligence, recruiting staffs, and staff colleges. He did not believe that the expenditure of the three fighting services was worked out on any co-ordinated scheme as to how much should be allocated to each. There ought to be only one staff dealing with these various services for the three forces. What he wanted was one Ministry of Defence and he thought that in Mr. Winston Churchill they had the man for the job, who was accustomed to direct warlike operations in all three elements.

Capt. Guest referred to the attacks made upon the Air Ministry in the press, and would ask those amateur critics whether they had the slightest idea of the number of duties which in the last ten years had been imposed upon and carried out by the small Air Force. Turning to the slowing down of the proposed expansion, he thought that good might come from this period of cessation of intense activity. Unless there was a continuity of policy there was no hope for the solution of the problems. Changing Governments seemed to feel free to alter the main policy, although a policy was needed which would outlast the precarious life of any one Parliament. He submitted that the body most suitable for the purpose of laying down such a policy was the Committee of Imperial Defence.

Maj.-General Sir Frederick Sykes agreed entirely with the necessity of having the three Estimates in front of them before dealing with one of the Estimates. He also thought it important that the three Service Estimates should be drawn up in a similar form. On the subject of general policy he thought the greatest problem now before the country was that of reduction of armaments with the concomitant problem of imperial foreign policy, and economy in defence. It was imperative that reasoned world opinion should give its verdict upon the whole question of economy. In the meantime he thought the reduction of armaments must be very gradual. He suggested the formation of a joint executive general staff to plan out the parts which Navy, Army, and Air Force should play in Imperial defence. The general staff for imperial defence must have executive power. Turning to the Air Estimates themselves, he disagreed entirely with the policy in force which gave a minute number of skilled men in the air and practically no reserve. The best form of reserve was commercial operations, official and unofficial research, and highly skilled men in factories. It was pleasant to see a welcome light in this regard in the conversion of the Middle East from a military route to a commercial route. Turning to the question of engines, Sir Frederick said that while engine production was the limiting factor in war expansion and skilled labour was the limiting factor in production it was unfortunate that the engine provision had been selected for the largest cut in the Estimates. He wanted one department for the three Services, and would support an amendment to the effect that there should be an inquiry into how best this could be carried into effect.

Rear-Admiral Sueter agreed with nine-tenths of what the Air Minister had said, but thought that delaying the expansion of the Air Service was a retrograde step. He thought the Estimates ought to be kept up to the standard laid down by four consecutive Governments. A great service like the Air Service should have more than one-seventh of the total money provided for the defence of the country. The only way to get the Estimates right was to have a Ministry of Defence. It was bad for the Air Service to have a fluctuating policy, and it was even worse for the industry. Four Governments had promised the industry stability by this expansion, and now they were going to cut down. He thought the industry had been very badly hit. They had had difficulty in getting their nucleus together, and now they were given another slap in the face. He would ask the Under-Secretary to give the industry as much work as he possibly could, and to cut out some of the work at Farnborough and give it to the industry. Turning to another subject, he thought it was most important that they should have more trained and skilled engineers in the Air Force. As regards airships, he suggested that two non-rigid airships of 400,000 cubic feet capacity should be obtained in order to train crews properly.

Colonel Wedgwood wanted to know what steps the Air Minister was taking to bring about the disarmament conference, and to apply it to the air forces throughout the world. He also wanted to know what steps were being taken to see that the development of the air arm was accompanied by a reduction of expenditure on the atrophied branches of the older services.

Lieut.-Col. Spender-Clay agreed with other speakers that it was a pity that the Estimates for the three fighting services could not be presented simultaneously. There was no proper correlation between the three services, and a good deal of blame was, perhaps, due to the Government itself, not only this Government but every Government which had been in power since the Armistice. No Government had laid down a definite policy, and everything had been left to fate. He particularly wanted to focus the attention of the Committee of Imperial Defence on the desirability of merging the Air Ministry within a Ministry of Defence.

Mr. G. Harvey moved that in the opinion of the House either the effective striking strength of the Air Force should be increased or the ground personnel and ministry staff should be reduced. Concerning the spirit of Locarno, to which reference had been made, he thought it evident that the only people who were studying this spirit were the British people. Other people did not seem to be taking the spirit of Locarno as it should be taken. He could not understand why the resources of France, Italy and Great Britain could not be pooled. Both those countries were debtors to Great Britain, and if by pooling, we could be relieved of any portion of the £120,000,000 which the armed forces were going to cost this year, it would be a considerable inducement to us to make some amelioration in the amount of debt they owed to us. His feeling was that we had not enough pilots or enough machines. It was no good talking about the spirit of Locarno to people who were not willing to listen, unless we were strong and determined enough to force our views upon them.

Sir Frank Nelson seconded the amendment proposed by Mr. Harvey, and rather criticised the expenditure on training establishments, notably Halton. As regards the estimates, he preferred not to vote £16,000,000, but anything the Air Minister liked to put forward, provided we should have the finest Air Force in the world. He was only concerned in seeing that, whether they spent £16,000,000 or £60,000,000, they spent it to the best advantage.

Sir Philip Sassoon, Under-Secretary of State for Air, replied to the proposed amendment. He denied the accuracy of the statement that the proportion of flying personnel to non-flying was disproportionate. We had a higher proportion of qualified pilots available than any other country. A numerous, highly skilled, and well-equipped ground force was essential to maintain an effective fighting force in the air.

Sir Robert Hutchison said the Air Ministry would be well advised to consult with the War Office and the Admiralty to see how far an interchange of officers could take place. It might be that we should arrive at a Ministry of Defence, but he saw no immediate chance of such a change.

Brig.-Gen. Charteris referred to the universal feeling throughout all the Services that sooner or later a Ministry of Defence would be necessary, and said the sooner it came the better for the Services.

Mr. Charleton revived the old suggestion of building aircraft in Government establishments.

Brig.-Gen. Warner considered it a mistake to stop the development of the Home Defence Force, as no practical gesture from any other country in the world had been given. He referred to the orders secured by foreign aircraft firms in the Dominions, and asked whether the Air Minister could not summon a conference of representatives from the various Dominions to discuss the question of aviation and to secure that when they placed their orders those orders should come to this country.

Mr. J. Hudson said the matter to be discussed was an increase of £500,000 to a net Air Estimate already about £16,000,000. This increase was to be provided under the apparent delusion that it was to secure the defence of the country. They would not secure the defence of the people by spending £16,000,000, or even by spending four times that amount.

Capt. Brass thought the practice of limiting the commissions of young air officers to five years was against the creation of an esprit de corps in the Service.

Lieut. Commander Kenworthy said the Air Minister had departed from the air policy laid down by the Prime Minister in 1923 on account of Locarno. He asked whether other nations had cut down their air force because of Locarno, and answered himself in the negative.

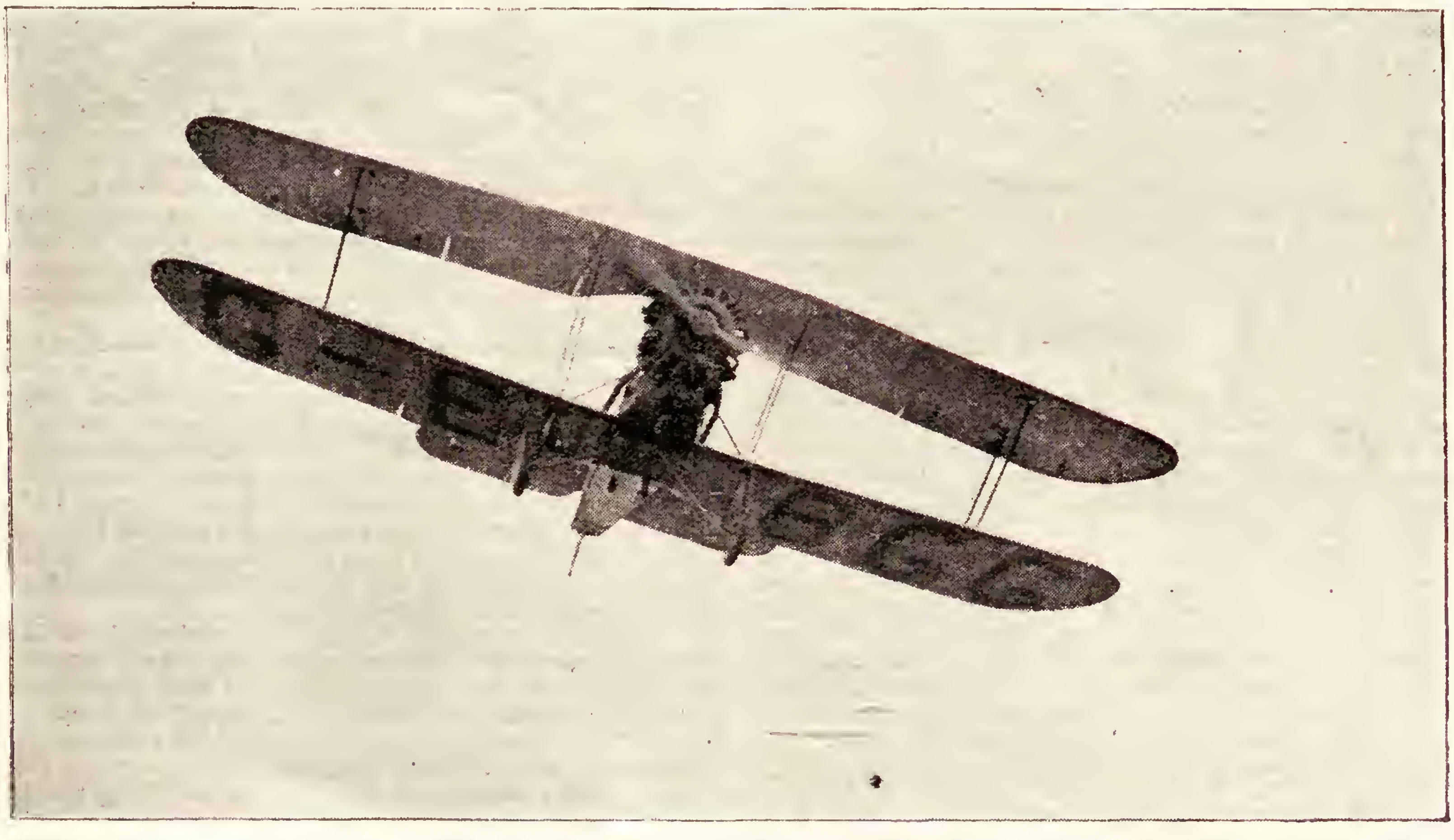
Capt. Reid said that Great Britain as an island would be freed from all hostile attacks by having an adequate and efficient Air Force, even though the Army and Navy were greatly reduced. He looked forward to the time when our Air Force would be increased to double its present strength, and when the Navy and Army would at the same time be decreased in size.

Sir Samuel Hoare, in reply to some of the questions raised, spoke at considerable length, and space does not permit of referring to more than one or two points here. He said it was obvious that there was a growing feeling that there ought to be much closer co-ordination between the three Services, and he believed that every great question of defence and strategy should first of all be considered by the three Chiefs of Staff collectively. He thought it better not to split a comparatively small service like the Air Force up into a number of different sections, and he would much rather try the ideal of spreading engineering knowledge through the whole Service, and try to make all pilots to some extent engineers. The policy of not creating a separate engineering service was showing not unsatisfactory results. They had found that the engineering standard in the Air Force was growing higher every year, and the number of accidents per flying hour was falling year by year. The Imperial Conference would be held next October, and he would bring up the question of air policy then, and would see that air questions had a prominent place on the agenda.

◆ ◆ ◆ ◆

A Senseless "Stunt"

ARISING, apparently, out of a wager, a young French military pilot, Lieut. Collot, has lost his life in performing a particularly senseless and dangerous "stunt." Flying a Breguet D.14, he left the Orly aerodrome on February 24, and on reaching the Eiffel Tower he dived close to the ground and flew under the lower platform of the tower. He cleared this safely, but, emerging from the other side, he collided with the wireless aerials, with the result that the machine crashed to the ground and burst into flames. Collot was burnt to death before he could be rescued. Orders have been given that a film taken of this "stunt" is to be destroyed.



THE BRISTOL "JUPITER" ENDURANCE TEST: Our photo shows the Bristol "Bloodhound" biplane fitted with a sealed "Jupiter" engine, arriving at Croydon, from Filton, on February 25. Since January 4, when the test started, the machine has been making daily trips between these two points, and no engine replacements have yet been made so far. On Tuesday over 200 hours' flying had been completed and over 22,500 miles flown.

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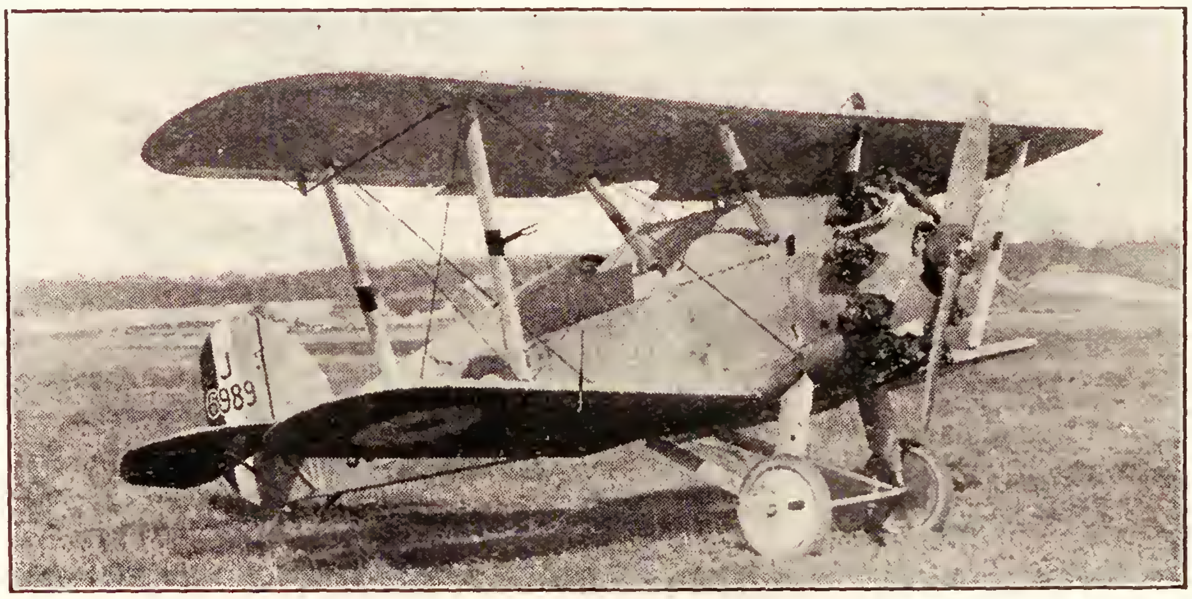

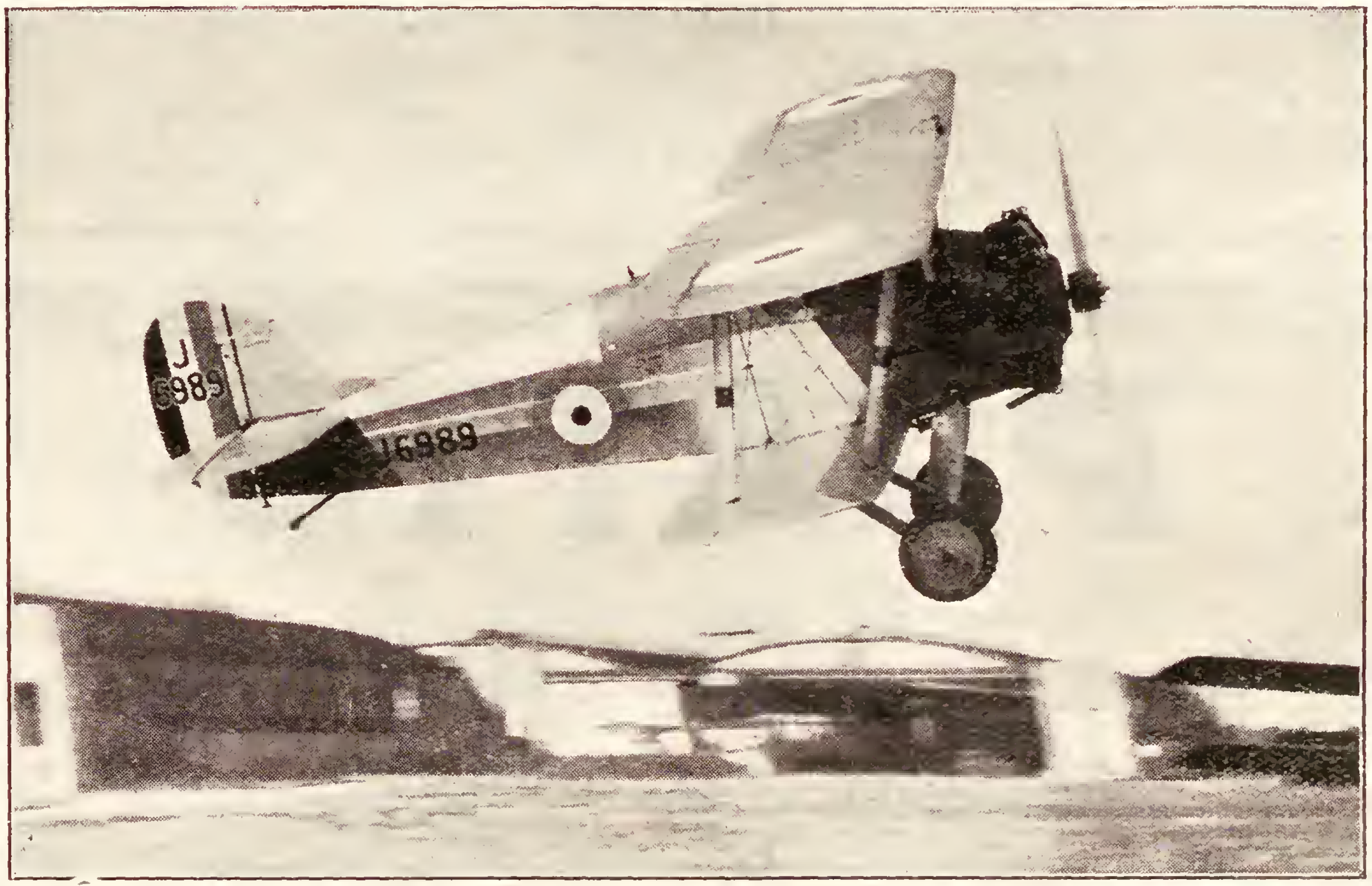

THE "HERON" S.S. FIGHTER WITH "JUPITER" ENGINE. [FLIGHT *photographs*

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THE WIRELESS EQUIPMENT OF THE DORNIER-WAL SEAPLANE "NE PLUS ULTRA"

Wireless apparatus now forms a very important part of the equipment of aircraft used for combatant services or for commercial purposes, and not the least of the many factors contributing to the successful trans-Atlantic flight of Comandante Franco is the use of the wireless apparatus installed on the Dornier-Wal seaplane—the "Ne Plus Ultra."

The Dornier-Wal seaplane is mainly constructed of metal, and was equipped with a Marconi standard type A.D.6 telegraph-telephone set and a marconi direction-finding (D.F.) set.

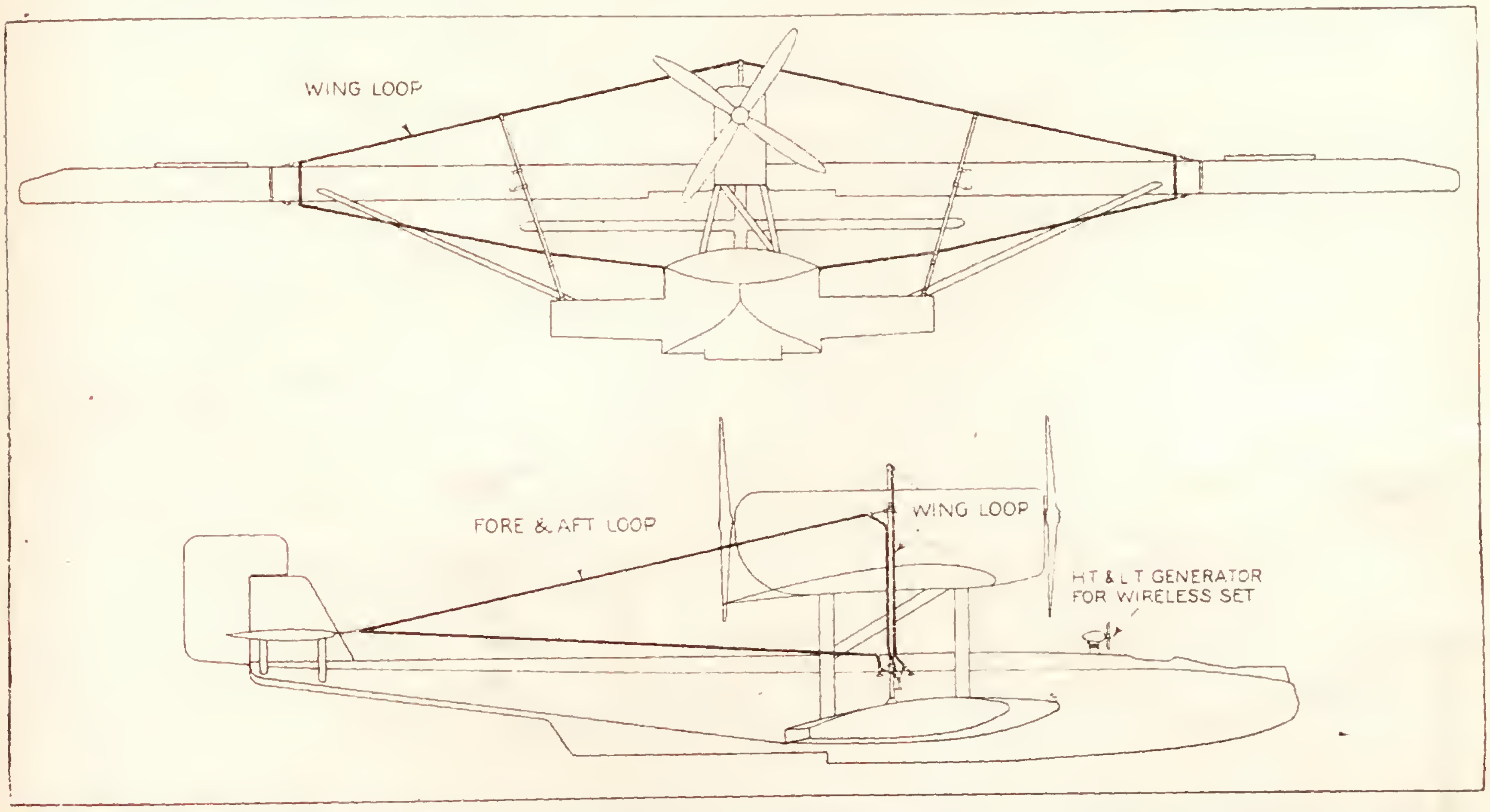
The metal construction of this machine, while assisting considerably in the reduction of magneto disturbances, adversely effects the receptive power of Bellini-Tosi, or any other loop aerial. In the usual wood and canvas construction no difficulty is presented in installing efficient loop aerials. In all metal machines it is therefore necessary to arrange the D.F. loops as far as possible from closed conducting paths. The limiting factor for reception of the Bellini-Tosi aerial is controlled by the area turns of the fore and aft loops, which should be as great as possible. The area turns, however, are limited by the fact that the loops and the supports must be able to withstand considerable wind pressures, vibrations and shocks, and the difficulty of designing a multi-turn loop supported clear of all masses of metal increases disproportionately with the number of turns. To meet these conditions, therefore, a special type of loop aerial was fitted on the machine, and the Marconi standard aircraft D.F. receiver was altered to increase the working range of the equipment.

The fore and aft loops consist of two single-turn loops supported on struts and arranged symmetrically on each side of the hull, great care being taken to avoid any out-of-balance effects due to the presence of large masses of metal. The two loops are connected in series, and the total area turns is approximately 250 sq. ft. In order to obtain equal reception with the wing coil, a single turn loop is mounted in the plane of the wing. The two sketches show the positions of the two fore and aft loops and the wing loop. The terminal ends of the loops are connected by a length of cable leading to the navigator's position near the pilot.

To increase the working range of the direction finder and to compensate for the smaller receptive power of the loops, it was found necessary to increase the overall magnification of the standard aircraft direction finder receiver. This was accomplished by the use of a 12-valve amplifier divided into two units. The first unit contains six stages of high-frequency amplification and a detector valve, and the second unit contains an oscillator valve, two stages of intermediate frequency magnification, a detector valve, and a note-magnifying valve. Ten Marconi standard type D.E.V. valves and two standard type D.E.Q. valves, taking a total filament current of 2·4 amperes at 3 volts are used. The anode voltage for the receiver is supplied by a 96-volt dry cell battery, and the filaments are run off an accumulator battery.

The radiogoniometer and high-frequency tuning unit are of the standard type supplied with aircraft equipments, and cover a wave-range of 600-1,000 metres.

The equipment was calibrated on wave-lengths of 600 and 900 metres, and the quadrantal error curves were well within the limits required for navigational purposes.



WIRELESS AND THE SPANISH TRANSATLANTIC FLIGHT: The above diagram shows the Marconi Wireless Direction Finding aerial arrangement as fitted on Comandante Franco's Dornier-Wal seaplane.

Results with D.F. Apparatus

Reports from Captain Ruis de Alda, the navigator who took the D.F. bearings during the flight, show that bearings were obtained at a distance of 700 kms. (434 miles) from Las Palmas, and such was the accuracy of the readings that the course was directed solely by the aid of the direction finder during this stage of the flight. When nearing Las Palmas visibility was very poor, but the signals from the shore stations enabled the navigator to maintain a direct course to his destination. The reader will, no doubt, be interested in the following extracts of a letter sent by the navigator, Captain J. Ruis de Alda, from Las Palmas to the Chief Engineer of La Compania Nacional de Telegrafia sin Hilos, Spain :—

January 25, 1926.

"At 50 kms. from the Spanish coast began the clouds which were at 200 m. over sea, and extended to Canary Islands. Therefore, in the case of flying below the clouds layer, we would not be able to do astronomics observations, and over the layer we would not see our deviations produced by the wind.

"Since the first bearing obtained, which gave Las Palmas at 7° starboard until the end of the flight, its work was mathematic; it was giving us the difference in angles of Las Palmas and Teneriffe. Briefly, since 11 a.m. we were directed solely by the D.F. I marked on the chart, obtaining them by the intersection of the two bearings, several points, and none was separated more than 5 miles from the ideal route.

"As we were approaching we heard all steamers in the vicinity of the islands, and all of them gave me a unique bearing as a whole, as the steamers were scattered around the islands. At 3 p.m. we perceived indistinctly a very far island on the port side, and Franco decided to make for it. I told him that the island in question was Lanzarote, and as he apparently was not convinced, I gave him the bearings obtained with the D.F., and they were giving mathematically the degrees we separated from our route. Then Franco, convinced, returned to the route, and we continued without seeing land until after 10 kms., when we saw close to us an island. We passed through a glade and the Puerto de la Luz (Las Palmas) was at sight. We landed, and remain here on account of the heavy sea, which does not allow us to leave, although I hope we shall proceed the flight to-morrow."

As regards the telegraph-telephone equipment, the standard type A.D.6 set was used for the transmission and reception of ordinary service messages. The essential components of both transmitter and receiver are mounted in one unit. The transmitting system comprises an aerial tuning inductance an oscillation valve, control valve, and a sub-control valve. The receiving system comprises an aerial tuning inductance and a five-valve amplifying detector.

The valves used on the transmitter are two Marconi standard type M.T.3F and one M.T.5 with a total filament current of 6·6 amperes at 6 volts. The receiving valves are two type V.24 and three type QX, with a total filament current of 3·75 amperes at 5 volts.

The wave-range of the transmitter and receiver is continuously variable between 400 and 1,200 m.

The system of remote control by means of Bowden cable enabled the operator to change over the send-receive switch, or to effect small adjustments in the tuning of the circuits.

A dual control equipment, comprising two microphones, two pairs of headphones, and two coupling units, enabled either the pilot or navigator to use the wireless set or to converse with each other.

Power for the anode circuits of the valves and for the filament lighting batteries was supplied by a wind-driven generator developing 100 milliamps. at 1,500 volts and 6 amperes at 7 volts. A trailing aerial approximately 200 ft. long was used for the set.

THREE BRITISH LONG-DISTANCE FLIGHTS

THERE are three big flights by British pilots, on British machines, now in progress :—Alan Cobham's dash home from Cape Town, the R.A.F. Cairo-Cape Town quartette, and another "dash home" from Karachi, which is being attempted by two R.A.F. officers, Flight-Lieut. Oliver and Flying Officer Brooke, on leave.

As previously announced in FLIGHT, Alan Cobham, having taken some time to accomplish the outward journey from London to the Cape (in order to make a thorough survey of the route), is hoping to get the best out of the D.H. 50J—Siddeley "Jaguar" combination on the home journey, and cover the 8,000-odd miles in something like record time. Up to the present he has been making excellent progress, except for a day's delay owing to tropical rains. Cobham, with A. B. Elliott (Engineer) and B. W. G. Emmott (Cinematographer), started off from Cape Town on February 26 and flew 300 miles to Beaufort West in 3 hrs. 2 mins. Proceeding after a short stop, he reached Kimberley after another 6½ hours' flying. Early next morning the 500-mile stage to Palapye Road was accomplished in 4 hrs. 55 mins., and after a rest of about an hour the flight was continued to Bulawayo. During this trip Cobham had to dodge numerous tropical storms, and only just managed to reach Bulawayo before a particularly violent storm burst.

The next day they started off at 7.30 a.m. and reached Broken Hill (530 miles) in 4 hrs. 50 mins. In the afternoon they continued on to N'dola, another 110 miles. They were unable to leave N'dola on March 1 as planned owing to the sodden state of the aerodrome, caused by the heavy rains, so about a thousand natives set to work stamping the ground down to a suitable hardness for taking off the next day.

As regards the R.A.F. flight—which follows much the same route as that taken by Cobham—this started on March 1, when four Fairey III D's (Napier "Lions") fitted with wheels left Heliopolis under the command of Wing-Commander C. Pulford, O.B.E., A.F.C. The other members of the expedition include Flight-Lieuts. L. E. M. Gilman, E. J. H. Hope and P. H. Mackworth, Flying Officers Jones and Payne, and Sergeants Hartley and Gardener. Making a stop at Assiut, the four machines flew to Assuan, where, unfortunately, one machine met with a slight mishap, loosing a wheel on landing.

Flight-Lieut. Oliver and Flying Officer Brooke, who are making a sporting, and unaided officially, attempt to fly from Karachi to London in five days, left Karachi, in a D.H.9 (Siddeley "Puma") on March 1, and hoped to reach Bushire that evening. Lieut. Oliver, however, was forced to descend at Pasni, about 250 miles from Karachi, and a fierce sandstorm prevented a resumption of the flight until early next morning.

ROYAL AERONAUTICAL SOCIETY

The annual general meeting of the Royal Aeronautical Society will be held on March 25, at 5 p.m., at the offices of the Society, 7, Albemarle Street, London, W. 1.

Agenda.—(i) To approve the report of the Council on the state of the Society, and the balance-sheet of Aerial Science, Ltd., as printed in the *Journal of the Royal Aeronautical Society* for March, 1926.

(ii) To discuss and determine such questions as may be proposed by the voters relating to the affairs of the Society, and to fill the vacancies on the Council for the ensuing year. Any voter desirous of proposing any subject for discussion at the annual general meeting shall give notice in writing to the Secretary, which shall be received by him not later than noon on March 17.

(iii) To consider the addition of the following to the rules :—"A postal vote may be ordered by the Council on any question affecting the welfare of the Society."

The retiring members of Council are : Sir W. S. Brancker, K.C.B., A.F.C., F.R.Ae.S. ; Mr. G. Brewer, F.R.Ae.S. ; Prof. C. F. Jenkin, C.B.E., M.Inst.C.E., F.R.Ae.S. ; Maj. A. R. Low, F.R.Ae.S. ; Mr. W. O. Manning, F.R.Ae.S. ; Mr. J. D. North, F.R.Ae.S. ; Lieut.-Col. A. Ogilvie, C.B.E., F.R.Ae.S. ; Sir W. N. Shaw, F.R.S., F.R.Ae.S. ; Mr. H. E. Wimperis, O.B.E., F.R.Ae.S. ; Mr. R. McK. Wood, F.R.Ae.S., who are eligible for re-election.

Nominations of candidates for election to the Council shall be signed by the voters proposing them (two voters and no more), and must be received by the Secretary by noon on March 6, with an intimation in writing by the voters nominated that they are willing to serve.

Will members please note that Capt. G. T. R. Hill's paper on "The Tailless Aeroplane" has been postponed from April 15 to April 22, and will be delivered at the Royal Society of Arts.

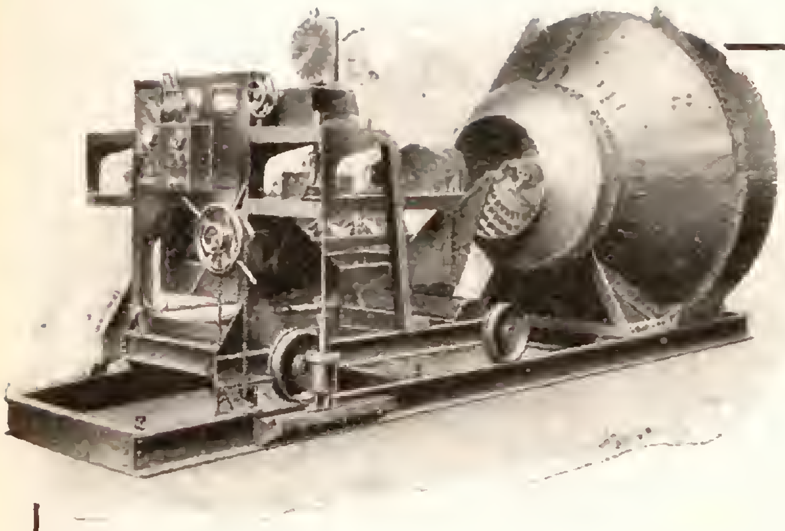
J. LAURENCE PRITCHARD,
Honorary Secretary.

Polar Airship's Trial Flight

THE Italian semi-rigid airship NR.1, on which Capt. Amundsen will attempt another flight to the North Pole this year, has been modified to meet the special requirements for the expedition, and on February 27 it made a successful trial flight from Rome to Naples and back. It was in the air for about eight hours and there were 30 persons on board, including Rüser-Larsen and other members of the Polar expedition. Successful tests have also been made in mooring the airship to a mast.

British Rigid Airship R.101

THE work of building the new 5,000,000 cubic ft. airship R.101 (this is the civilian or "Burney" airship), which will be employed on the service to India, will start in the first week in April at Howden, Yorks.



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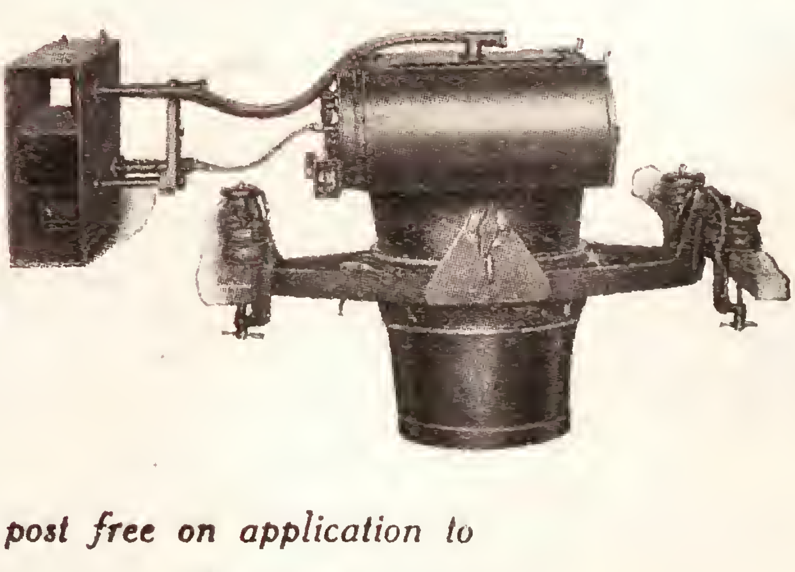

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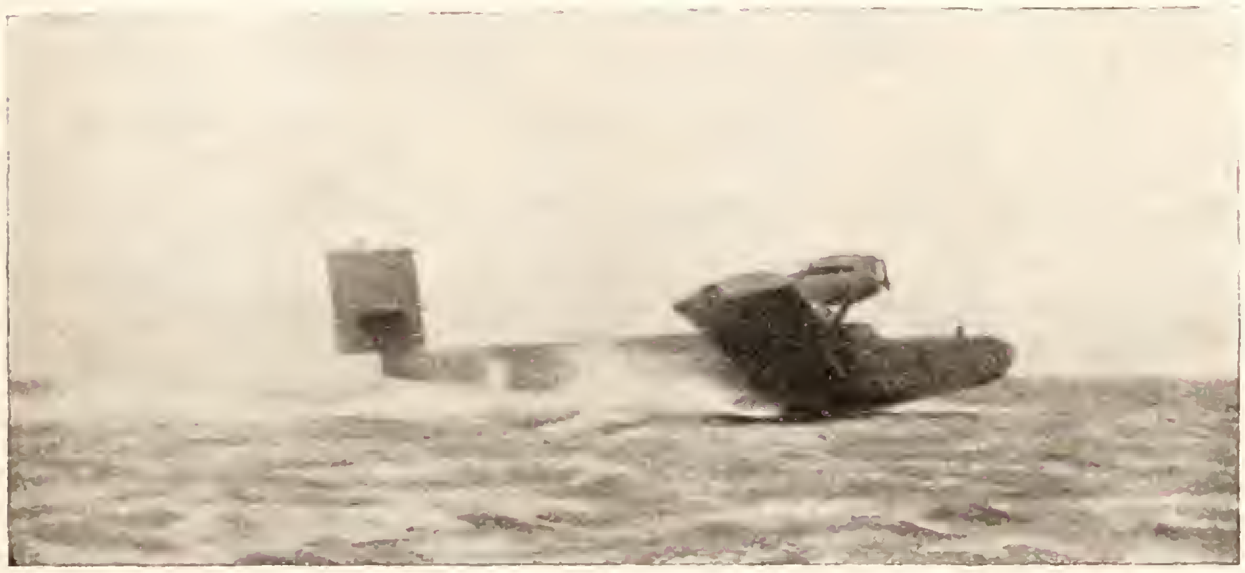

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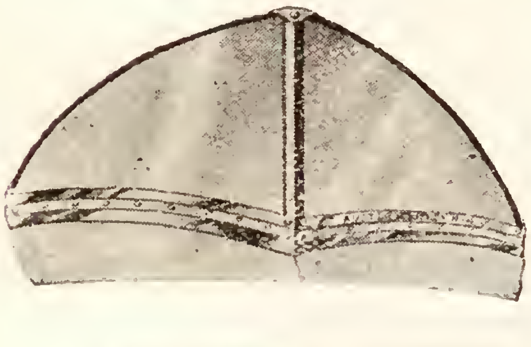

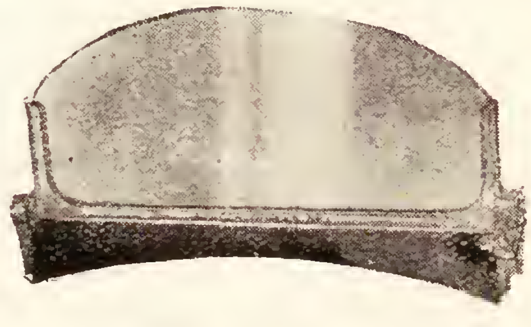

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THE ROYAL AIR FORCE

London Gazette, February 23, 1926.

General Duties Branch

The following Flying Officers are granted permanent commissions in this rank (Jan. 1) :—F. Kirk, G. V. Wheatley. Pilot Officer on probation F. C. Rowland is confirmed in rank (Feb. 5).

The following Flying Officers are transferred to the Reserve, Class A :—L. H. Ridley (Feb. 25) ; W. J. Walsh (Feb. 26).

Flying Officer J. Durward is transferred to the Reserve, Class B, in that rank and is granted permission to retain rank of Flight Lieut. (Dec. 7, 1925). (Substituted for *Gazette*, Dec. 8, 1925.) Squadron Leader A. W. C. V. Parr is placed on retired list at his own request (Feb. 24) ; Pilot Officer G. D. Venables relinquishes his short service commission on account of ill-health (Feb. 24) ; Pilot Officer W. E. Nicholls resigns his short service commission (Feb. 24) ; the short service commission of Pilot Officer on probation G. S. J. Bowman is terminated on cessation of duty (Feb. 5).

Flying Officer L. A. L. Firmin (Lieut., 4th Bn. The Buffs, T.A.) is dismissed the service by sentence of General Court-Martial (Feb. 11).

Stores Branch

The following Flying Officers are granted permanent commissions in this rank (Feb. 24) :—E. G. Keeping, A. J. Redman, D.F.C., D. A. W. Sugden, H. E. Young. The following Flying Officers are confirmed in their appointments in the Stores Branch and are granted permanent commissions in this rank (Feb. 24) :—F. H. Bedford, M.C., M.M., R. M. Taylor, M.C.

Medical Branch

Flying Officer R. H. Stanbridge is promoted to rank of Flight Lieut. (Feb. 19); Flight Lieut. H. E. Flavelle (Capt., Army Dental Corps), relinquishes his temp. commission on return to Army duty (Jan. 29).

Reserve of Air Force Officers

E. R. Meads is granted a commission in Class A.A., General Duties Branch, as a Pilot Officer on probation (Feb. 8).

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified :—

General Duties Branch

Group Captain R. C. M. Pink, C.B.E., to H.Q., Air Defences of Great Britain, for Air Staff duties ; 6.3.26.

Air Commodore C. L. N. Newall, C.M.G., C.B.E., A.M., to R.A.F. Depot Supernumerary, pending posting to the Air Ministry ; 1.3.26.

Squadron-Leaders : H. A. Tweedie, O.B.E., A.F.C., to No. 2 Armoured Car Co., Palestine ; 13.2.26. J. H. Simpson, to Air Ministry ; 1.3.26. A. J. Butler, O.B.E., M.C., A.F.C., to No. 4 Flying Training Sch., Egypt ; 10.2.26. R. Graham, D.S.O., D.S.C., D.F.C., to R.A.F. Staff Coll., Andover ; 1.3.26. B. E. Baker, D.S.O., M.C., A.F.C., to Experimental Section R.A.E., S. Farnborough ; 1.3.26.

Flight-Lieutenants : J. R. I. Scambler, A.F.C., to No. 2 Wing H.Q., India ; 10.1.26. H. W. Clayton, to No. 14 Sqdn., Palestine ; 29.1.26. E. B. Grenfell, A.F.C., to Station H.Q., Northolt ; 16.2.26. W. B. Everton, to Inland Area Aircraft Depot, Henlow ; 11.3.26. E. F. Waring, D.F.C., to Air Ministry ; 15.3.26. G. L. Ormerod, to Station H.Q., Duxford ; 16.2.26. C. D. Palmer, to No. 3 Group H.Q., Spittlegate ; 26.2.26.

Flying Officers : F. H. Astle, to Station H.Q., Spittlegate ; 22.2.26. B. Cheesman, M.B.E to Engine Repair Depot, Egypt ; 6.2.26. A. L. Pearce, to R.A.F. Depot, on transfer to Home Estabt. ; 12.1.26. H. Ford, D.F.C., to R.A.F. Depot ; 9.2.26. C. G. Hancock, to R.A.F. Base, Gosport ; 26.2.26. S. C. Black, M.M., to No. 84 Sqdn., Iraq ; 12.2.26. R. B. Jordan, to No. 31 Sqdn., India ; 12.2.26. J. J. Nolan, to No. 6 Sqdn., Iraq ; 12.2.26. R. Melbourne, to No. 8 Sqdn., Iraq ; 12.2.26. G. W. R. Russell, to No. 20 Sqdn., India ; 12.2.26. W. R. Heywood, to Sch. of Naval Co-operation, Lee-on-Solent ; 19.2.26. T. H. J. Wright, to No. 2 Sqdn., Manston ; 15.2.26. W. H. O. Rumfitt, to No. 7 Sqdn., Bircham Newton ; 15.2.26. M. Kortright, to No. 13 Sqdn., Andover ; 15.2.26. H. M. Whittle, to No. 502 Ulster Sqdn., Aldergrove ; 15.2.26.

Flying Officers : C. S. Whellock, to H.Q., Palestine ; 1.2.26. A. Lees, to No. 2 Armoured Car Co., Palestine ; 29.1.26. C. H. Jennings-Bramly, to No. 4 Armoured Car Co., Iraq ; 1.2.26. C. Ayling, to No. 23 Sqdn., Henlow ; 8.3.26. H. Little, to Sch. of Tech. Training (Men), Manston ; 19.2.26. J. W. Bell, D.S.M., to R.A.F. Depot ; 1.3.26. S. J. Stocks, to remain at No. 7 Sqdn., instead of to Night Flying Flight, as previously notified. R. W. E. Bryant, to No. 111 Sqdn., Duxford ; 19.2.26. A. E. Golds, to Night Flying Flight, Biggin Hill ; 14.2.26. A. E. Thompson, to R.A.F. Depot, on transfer to Home Estab. ; 29.1.26. F. C. Marsh, to No. 20 Sqdn., India ; 20.2.26.

Pilot Officers : E. B. C. Groner, to Aircraft Depot, Iraq ; 12.2.26. W. F. Rimmer, to No. 55 Sqdn., Iraq ; 12.2.26. B. A. C. Danbury, to No. 8 Sqdn., Iraq ; 12.2.26. B. W. Knox, to No. 30 Sqdn., Iraq ; 12.2.26. E. L. S. Ward, to Aircraft Depot, India ; 12.2.26. C. J. Pavia, to No. 502 Ulster Sqdn., Aldergrove ; 15.2.26. J. H. Barringer and C. Heard-White, to No. 207 Sqdn., Eastchurch ; 15.2.26. J. S. Blomfield, F. Sisson and C. J. Veevers, to No. 2 Sqdn., Manston ; 15.2.26. D. W. Gibbon, to No. 9 Sqdn., Manston, 15.2.26. V. T. Norwood, to No. 13 Sqdn., Andover ; 15.2.26. A. L. R. Page, L. T. Pankhurst, S. C. Parker, E. G. H. Russell-Stracey and W. R. J. Spittle, to No. 16 Sqdn., Old Sarum ; 15.2.26. P. B. Tomkins, to No. 39 Sqdn., Spittlegate ; 15.2.26. P. V. Williams, to No. 7 Sqdn., Bircham Newton 15.2.26. S. B. Flood, to No. 2 Flying Training Sch., Digby, on transfer to Home Estabt. ; 22.1.26.

Pilot Officers : P. H. Nicholls, to No. 20 Sqdn., India, instead of to Aircraft Depot, as previously notified ; 15.12.25. H. A. Evans-Evans, to No. 14 Sqdn., Palestine ; 29.1.26. L. Dalton-Morris, to Night Flying Flight, Biggin Hill ; 24.2.26. J. C. Noel, to No. 111 Sqdn., Duxford ; 19.2.26. K. C. Baker, to Heliopolis Details, Egypt ; 9.2.26. V. J. Sofiano, to No. 216 Sqdn., Egypt ; 10.2.26.

Stores Branch

Squadron Leaders : V. J. B. Jacobs, to H.Q., Egypt ; 13.2.26. W. Millett, to Air Ministry ; 13.2.26.

Flight Lieutenant : D. Mitchell, to Stores Depot, Iraq ; 27.1.26.

Flying Officers : A. McC. Goddard, to Aircraft Depot, Itaq ; 27.1.26. P. H. Wynne-Burt, to H.Q., Iraq ; 12.2.26. J. G. Smithson, to No. 13 Store Depot, Milton ; 9.2.26. P. Alderson, to remain at No. 1 Stores Depot, Kidbrooke, instead of to No. 2 Flying Training Sch., as previously notified.

Accountant Branch

Squadron Leader : H. F. Fuller, to R.A.F. Depot ; 1.3.26.

Flying Officer : R. W. L. Glenn, to No. 84 Sqdn., Iraq ; 12.2.26.

Medical Branch

Flying Officers : A. A. Townsend, M.B., to R.A.F. Depot, on transfer to Home Estabt. ; 12.1.26. G. M. Anderson, M.B., to No. 58 Sqdn., Worthy Down ; 4.2.26. E. J. Jenkins, to R.A.F. Depot ; 22.2.26.

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IN PARLIAMENT

Air Services

Sir H. Brittain, on February 18, asked the Secretary of State for Air whether any suggestion has been made to his Department for a seaplane service between Southampton and Cherbourg, or between any British port and a similar terminus in France ?

Sir S. Hoare : I know of no recent suggestion for such a service. When the existing Southampton-Guernsey service was first proposed the possibility of operating a service also to Cherbourg was considered, but Imperial Airways, Ltd., who would naturally undertake the further service, are confining themselves for the present to the line to Guernsey.

R.A.F. Aircraft and Engines

Sir F. Sykes, on February 22, asked the Secretary of State for Air (1) the numbers or proportions of aircraft on the Royal Air Force charge of which the designs were first produced prior to the war, during the war, and since the war, respectively ; (2) the numbers or proportions of aero-engines on charge of the Royal Air Force of which the designs were first produced prior to the war, during the war and since the war respectively ?

Sir S. Hoare : The strength of the Royal Air Force at the present time is approximately the equivalent of 56 regular squadrons. Of these 28 are equipped with aircraft and engines of post-war design, and two others are now in course of being so equipped. The remaining squadrons are equipped with aircraft and engines of types designed during the war, there being to-day no service aircraft of pre-war design in use. It would not be in the public interest to give more detailed information.

Sir F. Sykes asked the Under-Secretary of State for India (1) the numbers or proportions of aero-engines on charge of the Indian Government of which the original designs were first produced prior to the war, during the war, and since the war respectively ; (2) the numbers or proportions of military aircraft on charge of the Indian Government of which the original designs were first produced prior to the war, during the war, and since the war respectively ?

Sir S. Hoare : I have been asked to reply. All Royal Air Force squadrons in India at the present time are equipped with aircraft and engines of types designed during the war.

Ammunition and Explosives Inspection

Sir F. Sykes asked the Secretary of State for Air the numbers and cost of staff employed on the inspection of ammunition and explosives ; and what work of this nature, if any, is carried out by the Air Ministry for the other Service Departments ?

Sir S. Hoare : As regards the first part of the question, the number and cost of the staff at present employed by the Air Ministry for the purpose referred to are 18 and £3,500 respectively. As regards the second part, no inspection for the other Service Departments is carried out by the Air Ministry.

Air Navigation (Consolidation) Order

Captain W. Shaw asked what restrictions, if any, are in force against aeroplanes that are merely out for pleasure flying over towns and cities, and for which no Government purpose is served ?

Sir S. Hoare : Article 9 of the Air Navigation (Consolidation) Order, 1923, includes a prohibition, contravention of which is punishable by imprisonment or fine or both on summary conviction, of aircraft flights over any city or town except at such an altitude that the aircraft should be able to land outside the city or town if its means of propulsion were to fail. It also prohibits trick flying or exhibition flying over any city or town area or populous district, and any flying which by reason of low altitude or proximity to persons or dwellings or for any other reason is the cause of unnecessary danger to any person or property on land or water.

Headquarter Staff, Halton

Brigadier-General Charteris, on February 24, asked the Secretary of State for Air what is the number of commissioned officers employed on administrative duties, as apart from technical instructional duties, on the headquarter staff at Halton ?

Sir S. Hoare : The answer is 37 officers, this number being exclusive of a few officers temporarily borne as supernumerary to establishment, and also of four chaplains. Of the 37 officers in question, 13 are in command and general charge of the 2,000 aircraft apprentices, and 14 are employed on pay, store, supply and accounting duties.

Cranwell Cadet Training Cost

Mr. Merriman asked why the estimated gross cost of the education of a cadet at Cranwell for the current financial year is £615, as compared with the corresponding figure of £391 for Sandhurst ?

Sir S. Hoare : The chief reason for the difference is that, while there are over 500 cadets at Sandhurst, there are under 100 at Cranwell, and the distribution of the standing and overhead charges over a smaller number naturally results in a higher *per capita* cost. Furthermore, the Cranwell cadets receive a higher rate of pay than those at Sandhurst, and the cost of workshop training for them, which comes to over £7,000 a year, is considerably higher. The costing figure of £615 is based on past expenditure. There have recently been reductions in the Cranwell establishment, and the figure will probably be less in the coming year. I may add that in view of the technical instruction given at the Royal Military Academy at Woolwich, this Army Establishment is much more nearly comparable to Cranwell than is Sandhurst. The cost per cadet at Woolwich is £524 per annum, and the difference between this figure and the £615 per cadet for Cranwell is principally due to the fact that the number of cadets at the Royal Military Academy is more than double that at the Royal Air Force Cadet College.

Colonel Woodcock : Does that £615 include the cost of instruction in flying ?

Sir S. Hoare : No.

SOCIETY OF MODEL AERONAUTICAL ENGINEERS

The annual general meeting of the Society took place at Headquarters on Tuesday, February 9, M. A. F. Houlberg occupying the Chair. A review of the year showed steady progress within the Club, and there was distinct evidence that this progress was likely to continue throughout the coming year.

The officers for the ensuing year were elected as follows:—

President, Dr. A. P. Thurston.
Chairman, F. de P. Green.
Treasurer, W. E. Evans.
Secretary, B. K. Johnson.
Competition Secretary, R. Langley.
Technical Secretary, R. N. Bullock.

The 1926 flying programme was approved, and the accompanying table gives the dates of the forthcoming competitions:

The introduction of a Club Journal by Mr. W. E. Evans was greatly appreciated; this periodical will undoubtedly provide a means of keeping all members in closer touch with the work carried out by the Society.

Five new members were elected at the meeting.

Two new forms of competition were inaugurated for the coming flying season; viz.

1. Auto-giro competition (proposed by Dr. A. P. Thurston).
2. Speed competition (proposed by Mr. R. N. Bullock).

The rules for these will appear at a later date.

The Secretary will be pleased to receive any enquiries *re* the Society. Communications should be addressed to 58, Norton Road, Wembley.

B. K. Johnson,
Secretary, S.M.A.E.

Date.	Place.	Cup.	Competition.
April 10	Ground to be decided later	—	Speed trial day.
April 24	Sudbury	Weston Cup	For fuselage gliders.
		—	Freshman's Competition (any type).
May 8	Wimbledon	K. & M.A.A. Cup	Distance fuselage models.
		Pilcher Cup	Duration fuselage models (R.O.G.).
May 22	Sudbury	Model Engineer No. 1 Cup	For "Wing only" type of model.
		—	Competition for Novices (any type).
June 5	Wimbledon	Gamage Cup	Any type of model.
		Sir John Shelley Cup	Power-driven fuselage models.
June 19	Ground to be decided	S.M.A.E. Cup	Competition for fuselage speed models.
July 3	Welsh Harp	Lady Shelley Cup	Fuselage seaplanes.
July 17	Sudbury	Flight Cup	Auto-giro models.
July 24	Welsh Harp	—	Seaplane record day.
September 11	Sudbury	M.E. No. 2 Cup	Farman models (type O—1—P—1).
		—	Glider record day.

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AIR MINISTRY NOTICES

Examination for Aerial Navigators

An examination for 1st and 2nd Class Aerial Navigators' licences will be held at the Air Ministry, Gwydyr House, Whitehall, on Monday and Tuesday, April 12 and 13, 1926.

The syllabi and conditions of examination may be obtained on application to the Secretary, Air Ministry (A. & L.), Gwydyr House, Whitehall, London, S.W.1.

Applications to sit at this examination should be received at the above address not later than April 6, 1926. Candidates should give with their applications full details of any qualifications and experience they already possess.

No. 3 *of* 1926.

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Third Annual R.A.F. (India) Reunion Dinner

The annual R.A.F. (India) Reunion Dinner for officers who have served with the R.A.F. in India, will be held this year at the Savoy Hotel at 7.30 p.m. (for 8 p.m.) on Saturday, March 27 (the day of the R.A.F. *v.* Army Rugby football match at Twickenham). Tickets, 16*s.* 6*d.* (exclusive of wines). Evening dress and miniatures to be worn. It is requested that applications for tickets be made as early as possible, accompanied by remittances, to Flight.-Lieut. C. A. Elliott, R.A.F. Station, South Farnborough, Hants, from whom full details can be obtained.

Three Years' Civil Flying in Australia

On November 2 last the Queensland and Northern Territory Aerial Services, Ltd. (Q.U.A.N.T.A.S.), which company operates the aerial passenger and mail service between Charleville and Camooweal (825 miles), entered into its fourth year of activity. During this three years of office the "QUANTAS" have established an excellent record, as follows:—

Total mileage flown	303,477.
All-round efficiency	100 per cent.
Injury to passengers or personnel	Nil.
Surcharge letters carried	42,557.
Paying passengers	2,112.
Freight (excluding passengers' luggage)	20,452 lbs.
Total hours flown	2,620.

These figures (for which we are indebted to Shell-Mex, Ltd., who supply the "moving spirit of the undertaking") do not include taxi-flights off the mail route, some of which exceed 1,000 miles in length. The general increase in 1925 performance over that of 1924 was as follows:—Route passengers, 72 per cent.; taxi passengers, 86 per cent.; mails, 100 per cent.; freights, 130 per cent.

PUBLICATIONS RECEIVED

The Canadian Patent Office Record. Vol. LIV. Nos. 5 *and* 6. *February* 2 *and* 9, 1926. Canadian Patent Office, Ottawa, Canada. Price 25 cents.

Luftbarrikaden. By Fischer von Poturzyn. Adolf Sponholtz Verlag (G.M.B.H.), Hanover, Germany.

Official Gazette of the U.S. Patent Office, February 2, 1926. *Vol.* 343. *No.* 1. United States Patent Office, Washington, D.C., U.S.A.

Aeronautical Research Committee Reports and Memoranda: No. 982 (*M.* 30). *High Frequency Fatigue Tests.* By Prof. C. F. Jenkin. H.M. Stationery Office, Kingsway, London, W.C.2. Price 9*d.* net.

Sprazzi e Baliori. Vol. 3, *No.* 1. *January* 15, 1926. Magneti Marelli, Sesto S. Giovanni, Milan, Italy.

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AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations: Cyl. = cylinder; i.c. = internal combustion: m. = motor.
The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

APPLIED FOR IN 1925

Published March 4, 1926

4,089. J. Orlay. Airships. (242,934.)
4,478. A. Lepinte. Safety devices for aeroplanes. (229,670.)
6,813. H. Junkers. Flying-machines. (231,846.)
13,053. J. M. Russell. Parachutes. (234,141.)
14,826. G. M. Ball. Body harness for aviators. (247,062.)
18,720. J. W. Bowerbank. Radiators. (247,086.)

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Tottenham 37 (2 lines); 2488 (4 lines); "Britoxygen" Tottlane, London.

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Regent 6240 (3 lines); "Airdisco," Westcent.

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Boulton & Paul, Ltd., Norwich.
Norwich 851; "Boulton," Norwich.
Bristol Aeroplane Co., Ltd., Filton House, Filton, Bristol. Bristol 3906; "Aviation," Bristol.
De Havilland Aircraft Co., Ltd., Stag Lane Aerodrome, Edgware. Kingsbury 160.
Fairey Aviation Co., Hayes, Middlesex.
Hayes 136-7-8.
The Gloucestershire Aircraft Co., Ltd., Sunningend Works, Cheltenham.
Brockworth Aerodrome, Glos.
Cheltenham 1161-2-3-4; "Glosaircra, Cheltenham."
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Hampstead 7500.
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34160; "Pander."
Parnall, George, & Co., Coliseum Works, Park Row, Bristol.
4775 (2 lines); "Warplanes," Bristol.
Roe, A. V., Ltd., Manchester. City 8530, 8531, Manchester: "Triplane," Manchester.
Hamble, near Southampton:
Hamble 18: "Roe," Hamble.
Sauuders, S. E., Ltd., Cowes, Isle of Wight.
Short Bros. (Rochester and Bedford), Ltd., Seaplane Works, Rochester, Kent.
Chatham 627; "Seaplanes," Rochester.
Supermarine Aviation Works, Ltd., The, Southampton.
Woolston 37; "Supermarin," Southampton.
Vickers, Ltd., Vickers House, Broadway, London, S.W. 1. Victoria 6900 (13 lines); "Vickers," Sowest, London.
Westland Aircraft Works, Yeovil.
Yeovil 141 (4 lines); "Aircraft, Yeovil."

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Battersea 218; "Neocellon," Wands.
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Darlaston 87; "Roofs," Darlaston.

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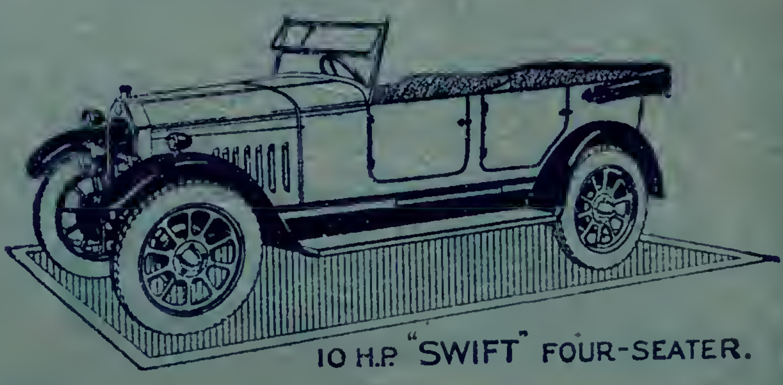

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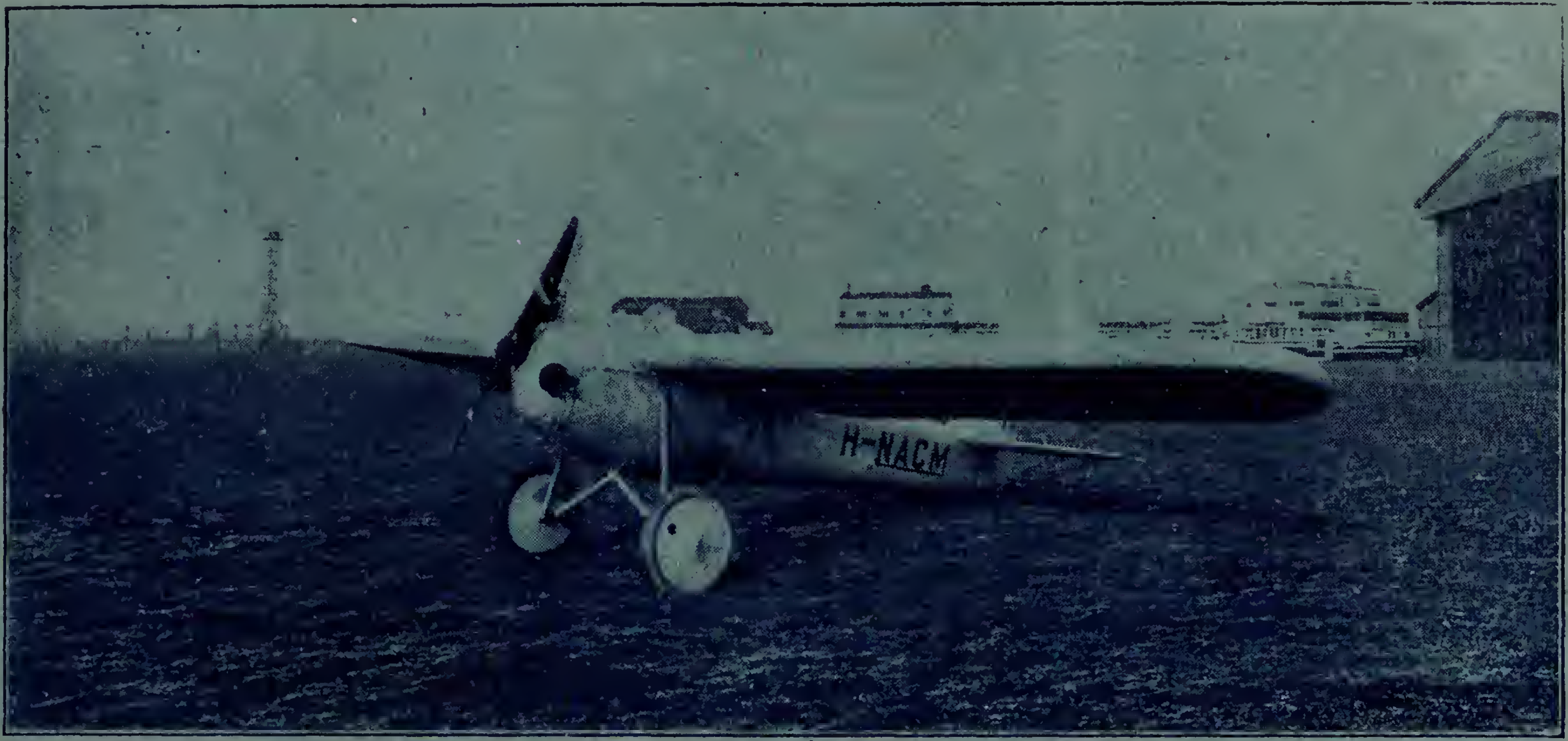

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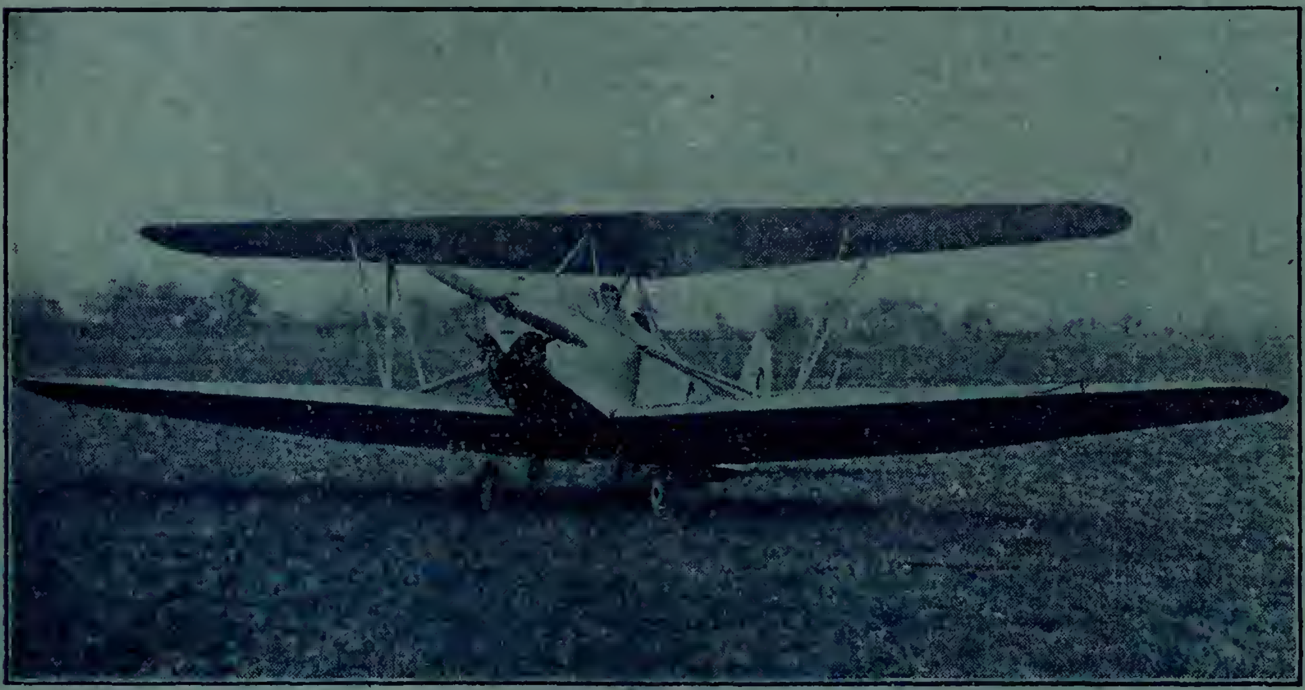

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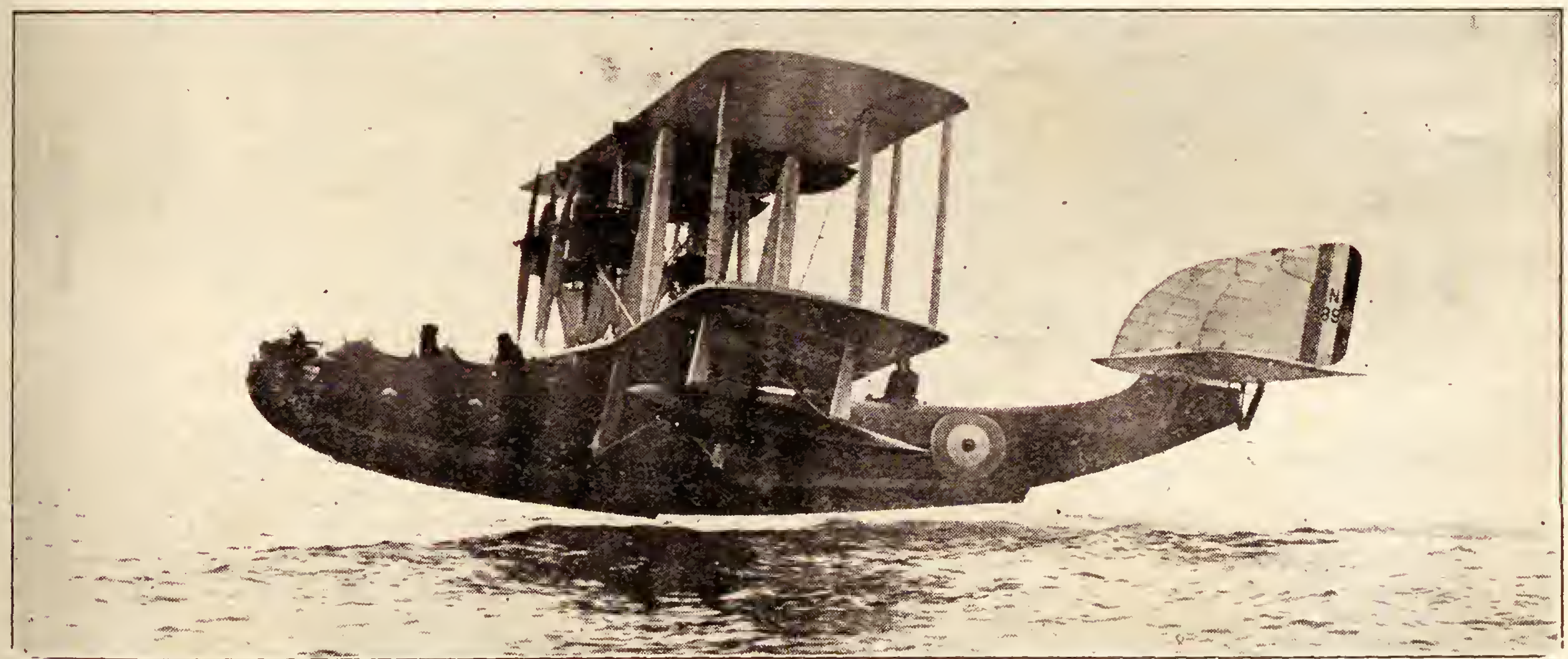

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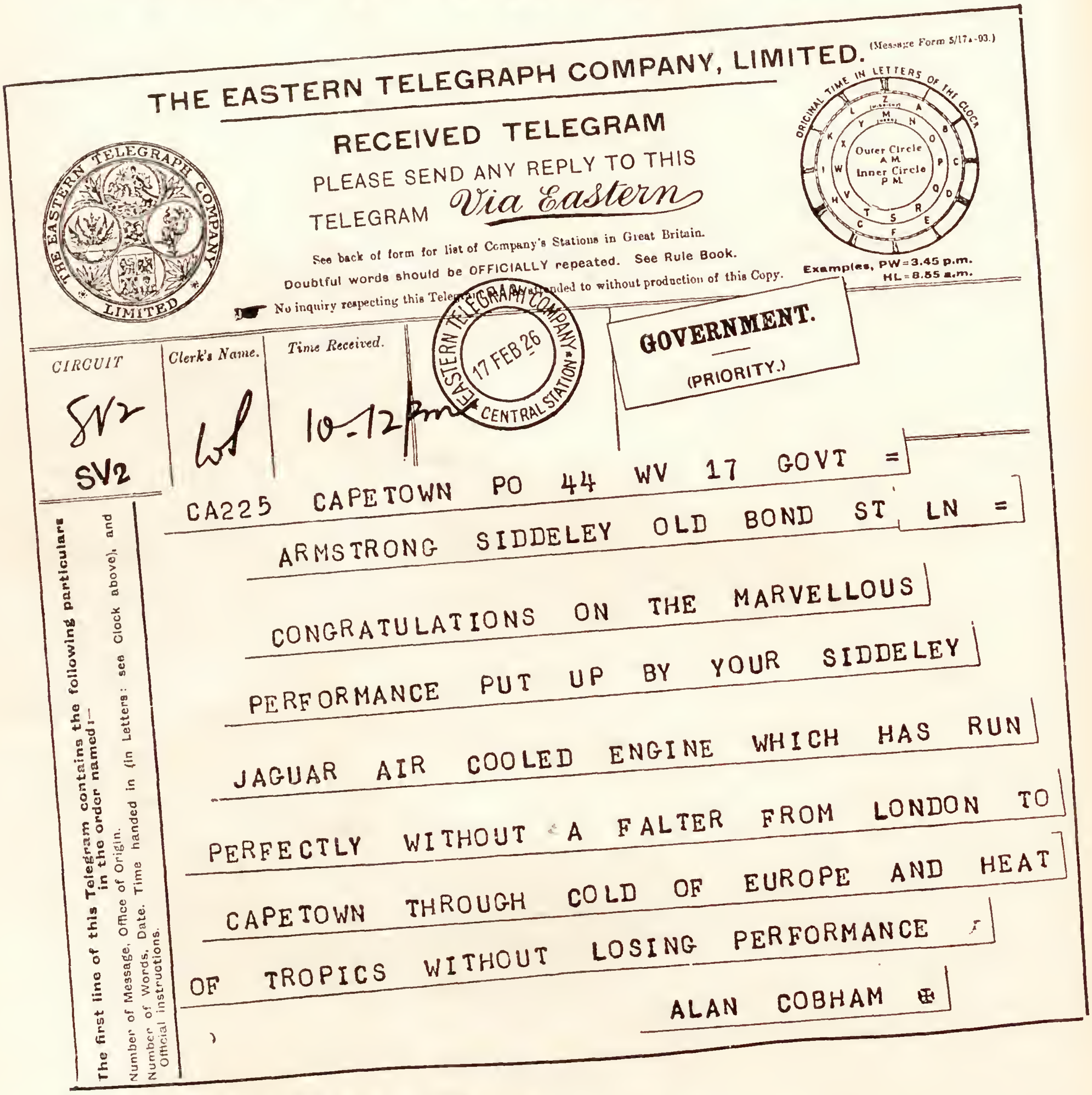

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CONTENTS

Editorial Comment PAGE
- Marine Aircraft ... 137
- The Southampton–Guernsey Air Route... 138*
- Another Link ... 138

Duralumin Construction ... 139
The Short S.7 "Mussel" ... 140
Aircraft and the Navy Estimates ... 145
Sir Samuel Hoare at Oxford ... 145
Light 'Plane Club Doings ... 146
American Aeronautics (Concluded) ... 148
In Parliament ... 150
Royal Air Force ... 151
R.A.F. Intelligence ... 151
Correspondence ... 151

DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:—

1926

Mar. 18	**Mr. A. J. Cobham. "Long-Distance Aeroplane Flights," before R.Ae.S.**
Mar. 22	**Entries close for Gordon Bennett Race.**
Mar. 31	**Entries close for Schneider Cup Race.**
Mar. 31	**Royal Aero Club Annual General Meeting.**
April 8	**Lecture by Marchese de Pinedo, before R.Ae.S.**
April 13	**Mr. S. H. Evans, A.F.R.Ae.S., M.I.Ae.E. "The Performance of Modern Aircraft—with special reference to the Variable Wing," before Inst.Ae.E.**
April 15	**Capt. G. T. R. Hill. "The Tailless Aeroplane," before R.Ae.S.**
April 21	**Inst.Ae.E. visit to Messrs. D. Napier and Son, Acton.**
April 29	**Lieut.-Col. V. C. Richmond. "Results of Recent Airship Flight Tests," before R.Ae.S.**
May	**Gordon-Bennett Balloon Race.**
May 11	**Capt. W. H. Sayers. "The Modern Theory of Aerofoils and its Application to Aeroplane Design," before Inst.Ae.E.**
July —	**German Seaplane Competition at Warnemunde.**

EDITORIAL COMMENT.

Marine Aircraft

OF quite extraordinary interest was the paper under the title "The Development of Civil Marine Aircraft," read by Mr. O. E. Simmonds, M.A., A.F.R.Ae.S., before the Institution of Aeronautical Engineers on March 9. Not only was the paper a very long one, which dealt fairly fully with a most fascinating subject, but Mr. Simmonds had managed to collect together a very considerable amount of useful data not, as far as we are aware, hitherto published, certainly not in the form given by the lecturer. One result of his examination of the subject was that according to the information collected—and the lecturer stated that he saw no reason to doubt its accuracy—the seaplane type of aircraft is by no means the inferior sort of vehicle that a lot of people had imagined, from the point of view of the paying load carried per horse-power. On this particular point the lecturer said he had been appalled to read in a paper by Sir Sefton Brancker before the Royal Aeronautical Society the statement that whilst the D.H. 34 carried 3·1 lb. of paying load per horsepower, and the Handley-Page W.8 3·85 lb., the Supermarine *Sea Eagle* could only muster 2·19 lbs. Taking the two single-engined machines for comparison, these figures indicated that the landplane type was 41 per cent. more efficient than the seaplane. Mr. Simmonds proceeded to examine the basis for these figures, and by making allowances for differences in power, engine weight, etc., as well as for the fact that the *Sea Eagle* was designed as an amphibian flying-boat, the lecturer arrived at the general conclusion that one was justified in assuming that, given the same power units, the efficiency, expressed in paying load per horse-power, was approximately the same for passenger landplanes as for flying-boats.

In view of the fact that the D.H.34 was for several years regarded as probably the best commercial aeroplane in the world, Mr. Simmonds's conclusions are highly interesting, especially since it must be borne in mind that, as everyone will, we think, agree, the seaplane has had nothing like the development from which the landplane has benefited. We on

FLIGHT have for many years been staunch adherents to the potentialities of the seaplane. Indeed we might go further and say that the seaplane is the only logical type for an island like Great Britain, and for an empire like the British. Mr. Simmonds's estimate, therefore, comes as a very welcome intimation that the belief hitherto held in most quarters, *i.e.*, that the paying load of the seaplane must *necessarily* be lower than that of the landplane, is at any rate open to doubt, and that until the subject has been thoroughly examined one should not be over hasty in jumping to conclusions.

As regards the reliability and seaworthiness of flying-boats, Mr. Simmonds quoted the following passage from an official report issued by the Air Ministry after the completion of a recent flight around the British Isles of four Supermarine "Southamptons": "Both cruises have shown that under conditions of weather which must throughout be considered distinctly bad, the "Southampton" flying-boats are capable of keeping the air and carrying out such observations as visibility will permit. What is more important, it demonstrates that a programme once having been drawn up, it can be adhered to practically independent of the weather. Refuelling at sea was carried out on all occasions without a hitch, and, provided a certain amount of shelter is available when the flying-boats are not flying, it has been demonstrated that they can function successfully, quite separately and independently of their land bases." "In these words," Mr. Simmonds said, "the Air Council has set its 'hall mark' on the seaworthiness of the flying boat."

◆ ◆ ◆

The Southampton-Guernsey Air Route

Another subject briefly referred to by Mr. Simmonds, and again during the discussion, was the unsuitability of the Southampton-Guernsey air route at present being operated in what appears to be a very half-hearted manner by Imperial Airways. It would seem that there is a service every Wednesday between these two points, and even this fact seems to be kept very secret, since we doubt whether, outside Southampton, fifty people are aware of the existence of this service. Quite apart from this fact, however, it is obvious that, although the Southampton-Guernsey route may have been and doubtless was in the earlier days, a very useful one for collecting information, it is not likely ever to attract much traffic, and it is high time that Imperial Airways bestirred themselves and took a somewhat more intelligent interest in the seaplane. Under the agreement with the Government the maintenance of a *regular* service with seaplanes is obligatory, but apparently nothing has been said about the frequency of this service. It thus looks very much as if the service were being maintained at the lowest possible intensity, merely to comply with the stipulations in the agreement. While that attitude persists we are not likely to make progress with seaplanes for commercial aviation, and the Air Ministry representatives on the board of Imperial Airways should make a point of using their influence towards a more practical use of the seaplane. Surely there is no difficulty about running services from some point fairly close to London, such as Tilbury, or even Harwich (both served by excellent boat trains) to Continental ports. Some time ago there were rumours of a suggested seaplane service (which incidentally very much gave the impression of a camouflaged German one) between the northern countries, Germany and Great Britain. We understand that negotiations are still in progress, but surely British interests are not best served by sitting down waiting for some foreign firm to take the initiative. One might think that foreign seaplanes were so much better than British that something of this sort was inevitable, whereas in point of fact the reverse is the case. For sheer seaworthines British seaplanes need not fear comparison with any foreign products, even if some foreign machines, by using much heavier loadings, can show a slightly greater paying load per horse-power.

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Another Link

By the time this week's issue of FLIGHT reaches our readers, or at any rate by the end of the week, it seems probable that, ruling out accidents, Mr. Alan J. Cobham and his companions will have returned to the Stag Lane aerodrome, after having covered something like 17,000 miles in their flight from London to Cape Town and back. Thus one more link will have been forged in the chain which will ultimately join up the hub of the British Empire to its most outlying points. The outward journey took some considerable time, owing to the necessity of carrying out observations of the route, and to other causes. The return journey has been made in excellent time, and would have been completed in even shorter time had it not been for very bad weather over portions of the route. We hope to return to the subject again next week. In the meantime we would express our admiration of the manner in which once more Cobham and Elliott have "carried the flag" on a difficult, and therefore all the more meritorious, flight.

Concerning the technical equipment, the aeroplane used, a de Havilland D.H.50, is of a type that has already won fame for other long-distance flights such as, to mention but one, the flight from London to Rangoon and back last year, when the Director of Civil Aviation, Air Vice-Marshal Sir Sefton Brancker, was the distinguished passenger. For that flight it may be recalled, Mr. Cobham was awarded the Britannia Trophy for the most meritorious performance in 1925. On the London-Cape Town-London flight the power plant was an Armstrong-Siddeley "Jaguar," which thus has the distinction of being the first British air-cooled radial engine to complete a flight between points as far separated as are London and Cape Town. As far as can be gathered, the engine has run admirably throughout the flight, so that what with this and the long run without overhaul just completed by the Bristol "Jupiter" between London and Bristol, it may be claimed that British air-cooled engines have proved themselves without doubt among the finest in the whole world.

■ ■ ■ ■

Mr. Sigrist indisposed

IT is with regret that we learn that Mr. F. Sigrist, co-managing director with Mr. T. O. M. Sopwith of the H. G. Hawker Engineering Co., has been ordered by his doctor to take an enforced rest from his arduous work. Mr. Sigrist has gone to the south of France for a month or so, and we are sure our readers will join us in expressing the hope that his stay in milder latitudes will quickly benefit his health and allow him to return to "harness."

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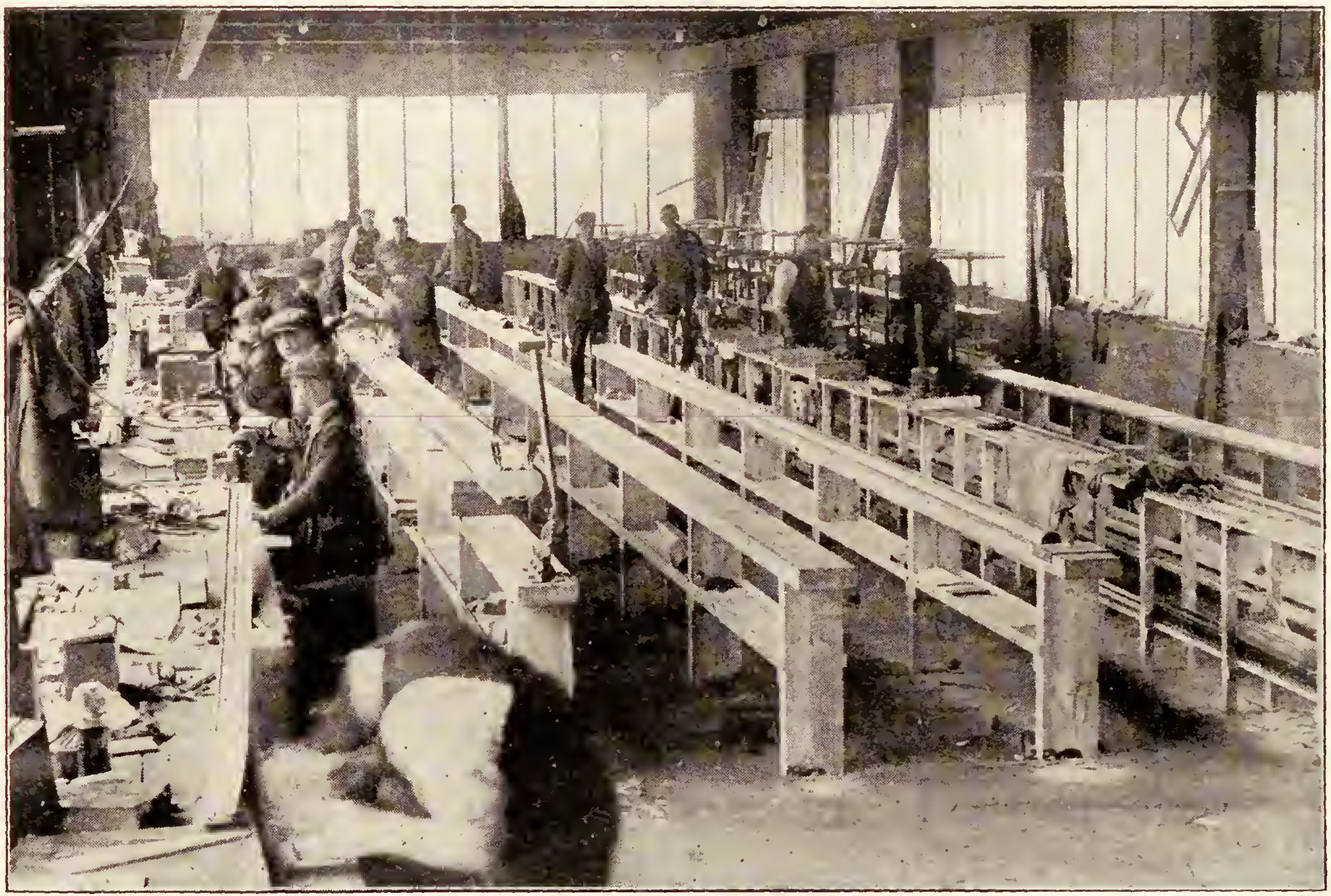
DURALUMIN CONSTRUCTION ON ORIGINAL LINES

Some Impressions of a Visit to the Works of Short Brothers

For very many years the development of aircraft construction in Duralumin was retarded, as far as Great Britain is concerned, by the official view that this material was not sufficiently reliable and consistent to make it advisable to employ it for parts that had to resist heavy stresses, in other words, for main-structure parts. Other nations, however, did not share that view, and in Germany several designers have employed the metal successfully for a number of years. Rather more recently, French designers have turned their attention to the use of Duralumin, and by now there are in France very many aircraft firms who use this metal extensively, and as far as can be gathered, the "snags" which were expected by people in this country have not materialised. It is true, that France has had a very real incentive to making an effort to develop Duralumin construction in the fact that aluminium is a plentiful home product in France, whereas steel of the qualities suitable for aircraft construction has to be imported. Apart from this fact, however, several French aircraft designers hold the view that judged on its qualities only, Duralumin offers advantages.

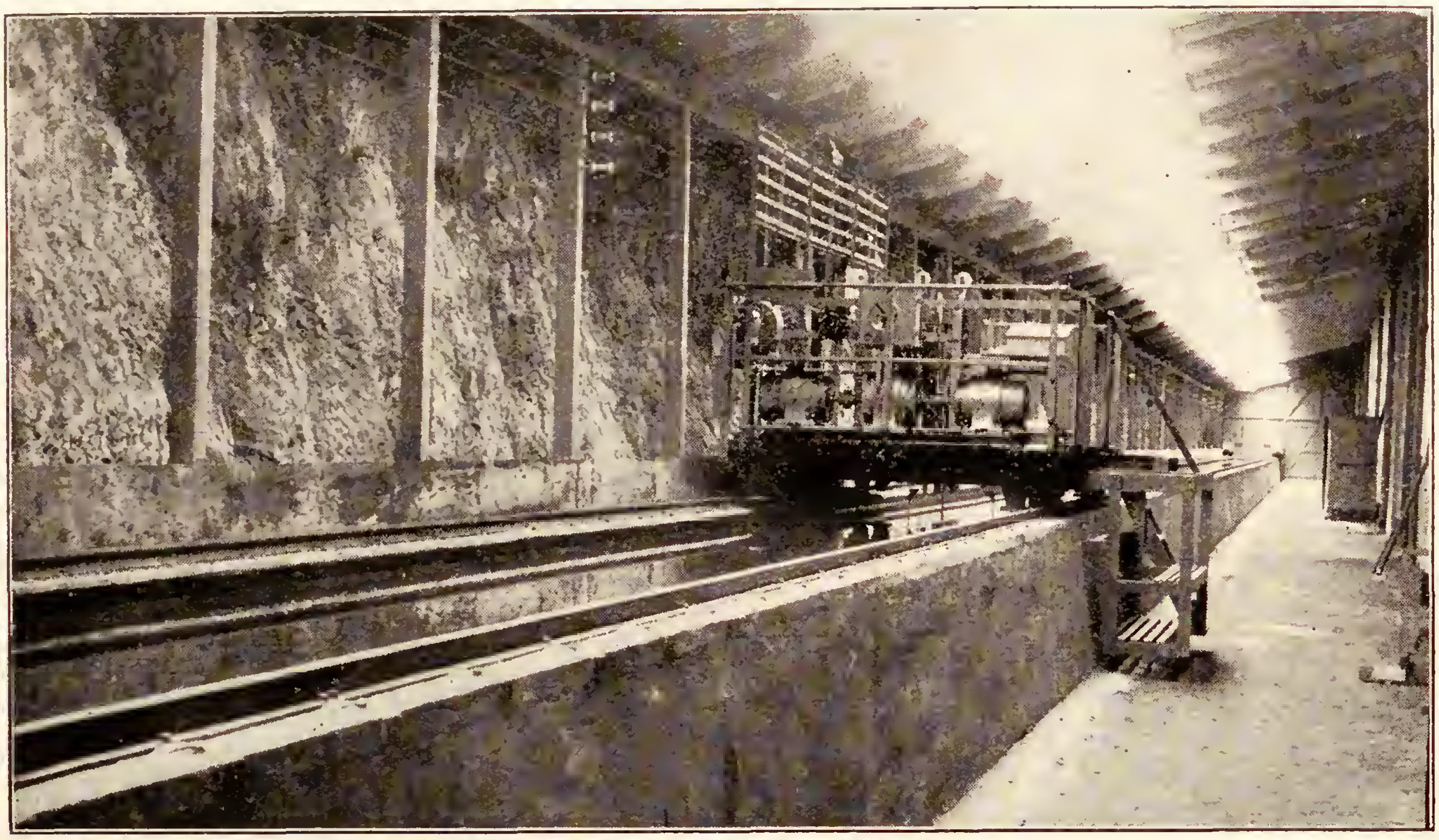


AT THE ROCHESTER WORKS OF SHORT BROTHERS: **A general view in the shop in which metal spars are made. Although capable of producing spars for very large machines, the equipment is by no means elaborate.**

In Great Britain, as we have said, development was retarded because of a certain official distrust of the material, and it is not until comparatively recently that a start has been made with all-Duralumin aircraft construction. For the change in the official attitude towards Duralumin as an aircraft material, Short Brothers, of Rochester, one of the pioneer aircraft firms of Great Britain, can claim a good deal of credit. Immediately after the war, Mr. Oswald Short, favourably impressed by the possibilities of using Duralumin, and with very considerable experience in rigid airship construction to draw upon, decided to construct an aeroplane in which Duralumin was used extensively. This machine, the "Silver Streak," had an all-Duralumin fuselage, and wings having Duralumin ribs, while the covering was in the form of very thin Duralumin sheets. The wing spars, however, were in the form of steel tubes of circular section. The fuselage was remarkable on account of the form of construction, in which there were no longitudinals, or longerons, running right through. The fundamental principle consisted in the use of a series of hoops or formers of L and channel sections, to the flanges of which the Duralumin sheet covering was riveted. The covering was stiffened against compression loads by longitudinal V-section strips, interrupted at the formers. This machine was flown a great deal after the Olympia show, and its clean lines resulted in a very good performance for the power of the engine fitted. After various delays, orders were placed for a few machines of this type, and one was, we believe, tested to destruction at Farnborough.

The "Silver Streak" may be said to have marked the beginning of Duralumin construction at the Rochester works of Short Brothers, and although orders have been none too plentiful, the firm has managed to forge ahead and to develop the special form of construction of which the "Silver Streak" was the first example. Changes have been made since, notably in wing construction, the spars of which are no longer circular section steel tubes, but built-up Duralumin box spars, but as regards the fuselage construction, the original type has been essentially maintained.

Comparatively recently the same principle, with minor modifications, dictated by local requirements, has been applied to the construction of flying-boat hulls, and one of these, built to take the standard superstructure of the F.5 flying boat, has now been in service for a considerable period, and has, we believe, given excellent results as regards durability and seaworthiness. A very great point in favour of metal hulls is, of course, the absence of water soakage which in large boats may amount to several hundred pounds. If a Duralumin hull is watertight, and so far the experience of Short Brothers has been that there is no difficulty in making such a hull watertight, the absence of soakage alone would appear to justify the use of such hulls. It seems, however, that with the forms of construction originated and developed by Short Brothers there is the further advantage that the Duralumin hull can be built with a very considerable gain in structure weight. If, as appears likely, protective coatings can be discovered which will prevent altogether the corrosion



AT THE ROCHESTER WORKS OF SHORT BROTHERS : The tank in which models of flying boat hulls and seaplane floats are tested. This equipment has been of inestimable value in producing hulls and floats having a good water performance.

troubles which formed the main drawback to the use of Duralumin in the earlier days, the Duralumin hull should also score on the point of durability, so that everything considered, it will scarcely be denied that this form of construction holds out great promise, and it is to be hoped that the firm which may be said to have pioneered Duralumin construction in Great Britain, will in time reap a suitable reward for its foresight and perseverance in the face of many obstacles.

We recently had an opportunity of seeing at Rochester some of the work being carried out, and although official regulations prevent any reference to a large percentage of the work, it is hoped that the following impressions, incomplete and disjointed as they necessarily are, may serve to give at anyrate some idea of the extent to which this firm has advanced along entirely original lines.

A very large flying-boat was in course of construction. As this is being built for the Air Ministry it is not possible to refer to it, either by name or by description. It is a machine of rather unusual design, and the Duralumin hull is a very wonderful piece of work, the manner in which the Duralumin plating is attached in such difficult places as the reverse curvature occurring where the hull sides are swept into the chines being quite a feat in construction. Without knowing the actual dimensions of this hull, we should imagine that it is probably one of the largest boat hulls ever built entirely in metal, and it is worth noting that the weight promises to work out very considerably lighter than that of a wooden hull of the same size.

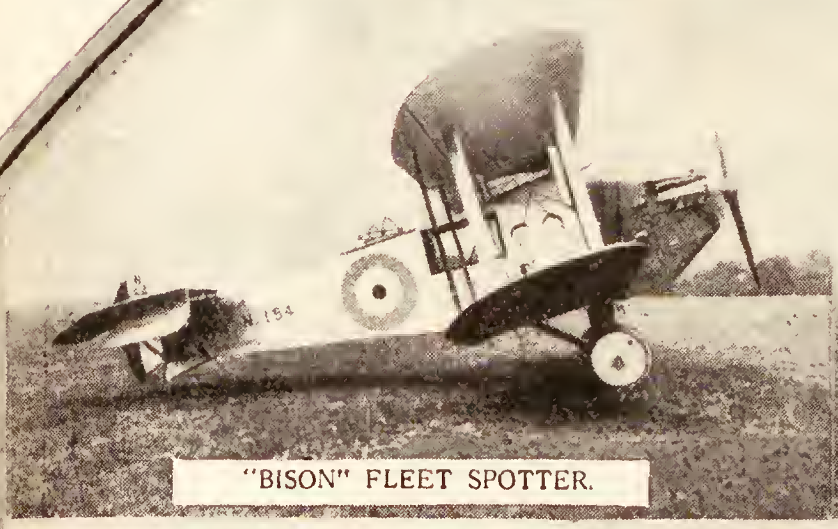
While on the subject of hulls, it may be mentioned that we had an opportunity of examining the Duralumin floats of the British Schneider Cup seaplanes, those of Hinkler's "Gloster" having been repaired by having new "noses" put on them where they were damaged by the propeller when the undercarriage struts collapsed. Under the terrific shock the front watertight bulkheads held, and the rest of the floats was not damaged. The facility with which the damaged floats were repaired is rather an eye-opener to those who have held the view that metal aircraft is difficult to repair. The internal construction of these floats is very simple, and we gather that the weight works out somewhat smaller than that of the best wooden floats of the same dimensions.

In many ways the most interesting shop which was inspected during our visit was that in which the metal spars are made. In an article by Mr. Oswald Short, published in THE AIRCRAFT ENGINEER on January 28, 1926, a photograph was given of a Short Duralumin spar under test. One of the accompanying photographs shows the spar shop, from which it will be seen that the plant employed at the Short works for the manufacture of Duralumin spars is by no means an elaborate one. In fact, it might almost be described as primitive but for the fact that the word rather suggests something of a makeshift nature, and might thus convey an entirely wrong impression. The present plant has not been arrived at without a great deal of experimental work being carried out, and the simplicity of the wing manufacturing equipment is rather like the apparently simple drawing of a clever artist, who has spent a great deal of time in learning "just now" to attain the appearance of simplicity. Without going into detail it may be mentioned that the present wing plant is not excessively costly, even for the production in small quantities, while capable, should the need arise, of producing wings in large quantities at quite a good rate and, of course, very much lessened cost. In this matter one received the impression that, whatever may be the relative merits of steel and Duralumin construction *per se*, the minimum plant necessary is a good deal lower in cost for Duralumin than for steel.

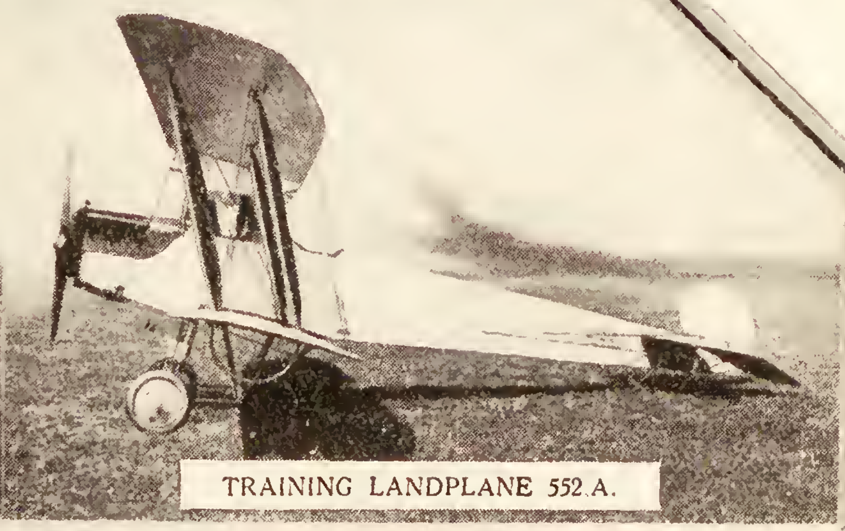
It goes without saying that the all-Duralumin construction is not carried out without its concomitant equipment for the heat treatment of the metal, and an inspection of the normalising baths proved most interesting. Here the metal, whether in sheet or in the form of rivets, is heated to a certain temperature, after which the material is put through its various processes of manufacture, such as pressed into the required shape for wing spars, etc., as regards the sheet, or, in the case of rivets, the riveting done within an hour after normalising.

Concurrently with actual construction, a considerable amount of research work is being carried out on the corrosion of aluminium alloys, on protective coatings, on watertight joints, on electrolytic action, and on many other problems which the use of metal for seaplanes brings with it. Incidentally we may mention that we inspected a Duralumin petrol tank in which riveting was employed for providing the necessary tightness, which in view of the difficulty of making a petrol-tight joint, impressed one as being something of an accomplishment.

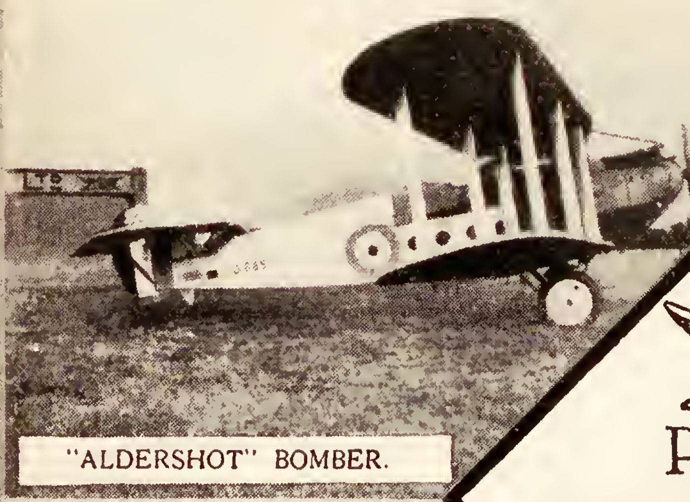
On the design side we were privileged to inspect the large water tank, the equivalent of the Froude tank at Teddington, which Mr. Oswald Short had built some two years ago. The equipment of the tank is, although different from that at Teddington, highly effective, and the electric trolley can be run up to a speed of round about 12 knots for a sufficient period to get a reading of the various instruments used for measuring and recording the forces on the model under test.



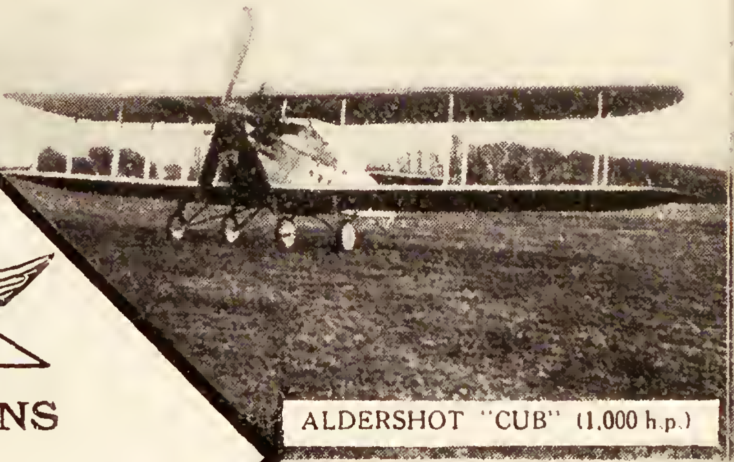
"BISON" FLEET SPOTTER.



TRAINING LANDPLANE 552.A.



"ALDERSHOT" BOMBER.



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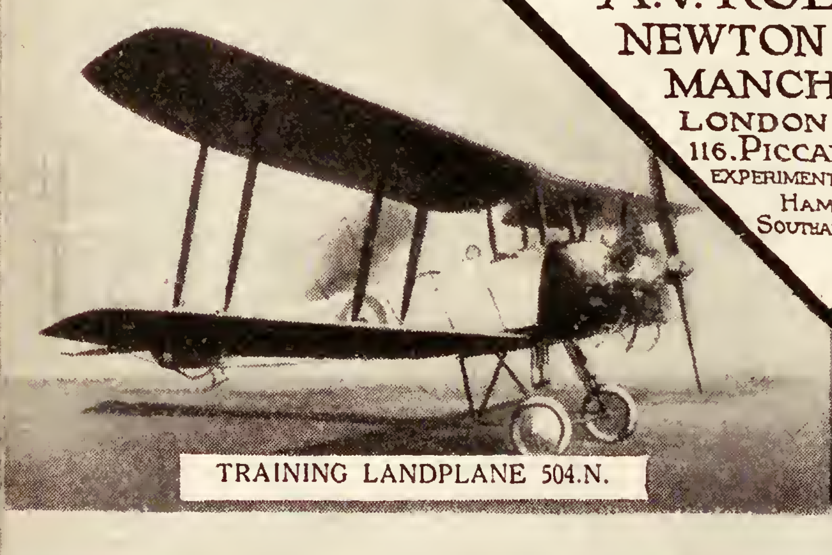
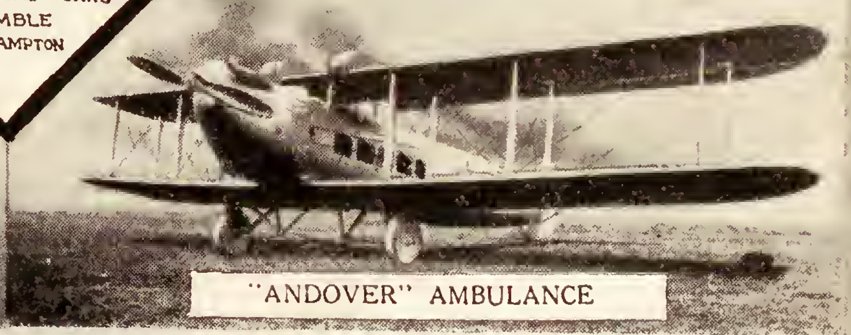
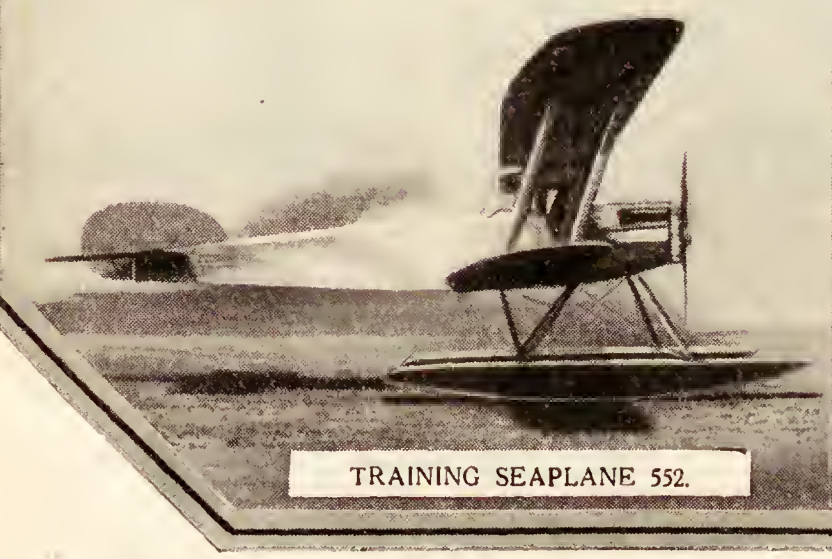


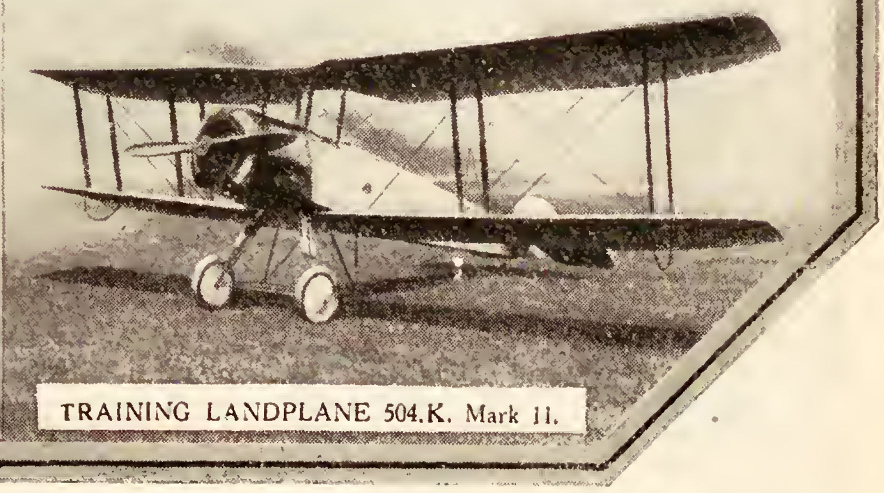
TRAINING LANDPLANE 504.N.



"ANDOVER" AMBULANCE



TRAINING SEAPLANE 552.



TRAINING LANDPLANE 504.K. Mark II.

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A platform on the side of the trolley enables observers to watch the bow wave thrown up by the model, and its behaviour generally while travelling through the water. Already, we believe, the tank has been instrumental in getting rid of certain vices on the water to which boats and floats are prone, so that these were discovered and remedied before the full-size construction was commenced, thus avoiding a considerable waste of money and loss of time.

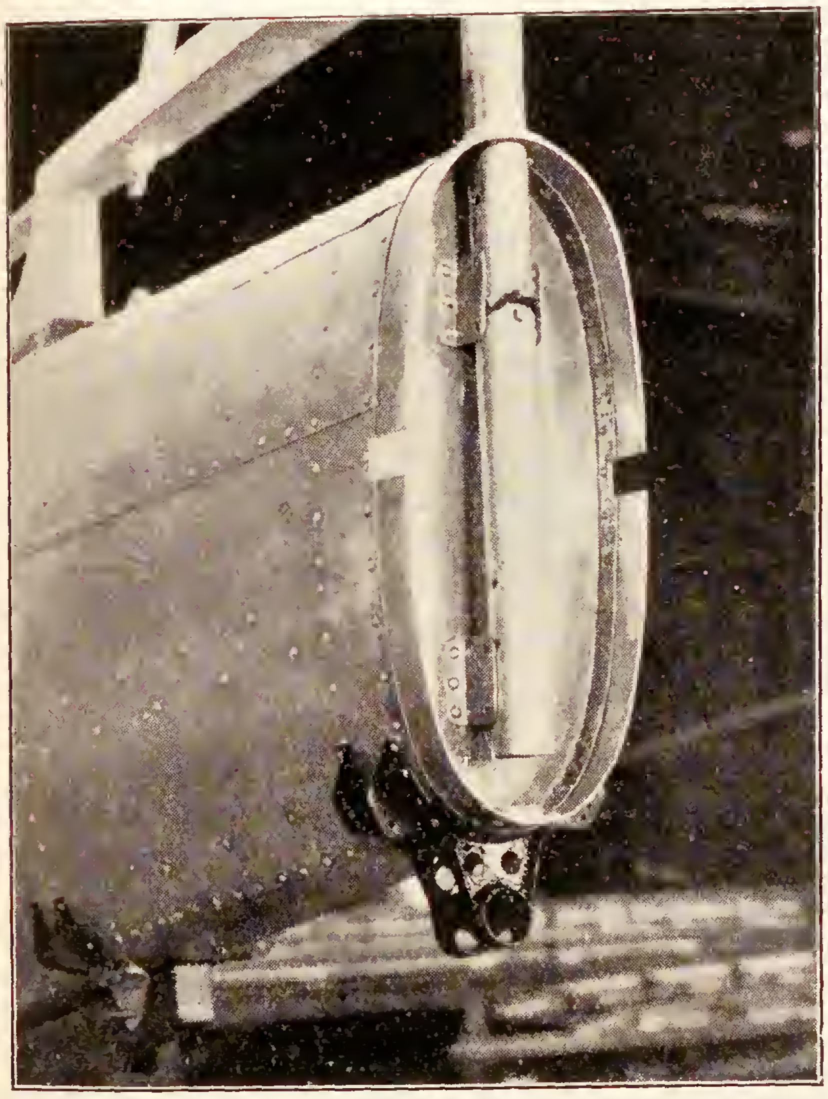
On the aerodynamic side a brief reference may be made to the pendulum testing apparatus, which at Short's takes the place of the more usual wind channel. This apparatus has previously been described in Flight, and it may be recalled briefly that the apparatus consists of a long pendulum to which the model is attached, the pendulum being raised to a horizontal position and then released, the height to which it swings on the opposite side being a measure of the drag of the model.

There is a great deal about which columns could have been written, but unfortunately, from the point of view of a technical journal, so much of the work is of a secret and confidential nature that one may not even refer to some of the subjects. One came away from Rochester with the feeling that, although it is one of the oldest of British aircraft firms, Short Brothers are keeping well abreast of the times, and that they seem destined to become pioneers once more, this time in the all-Duralumin construction of aircraft.

THE SHORT S.7 " MUSSEL "

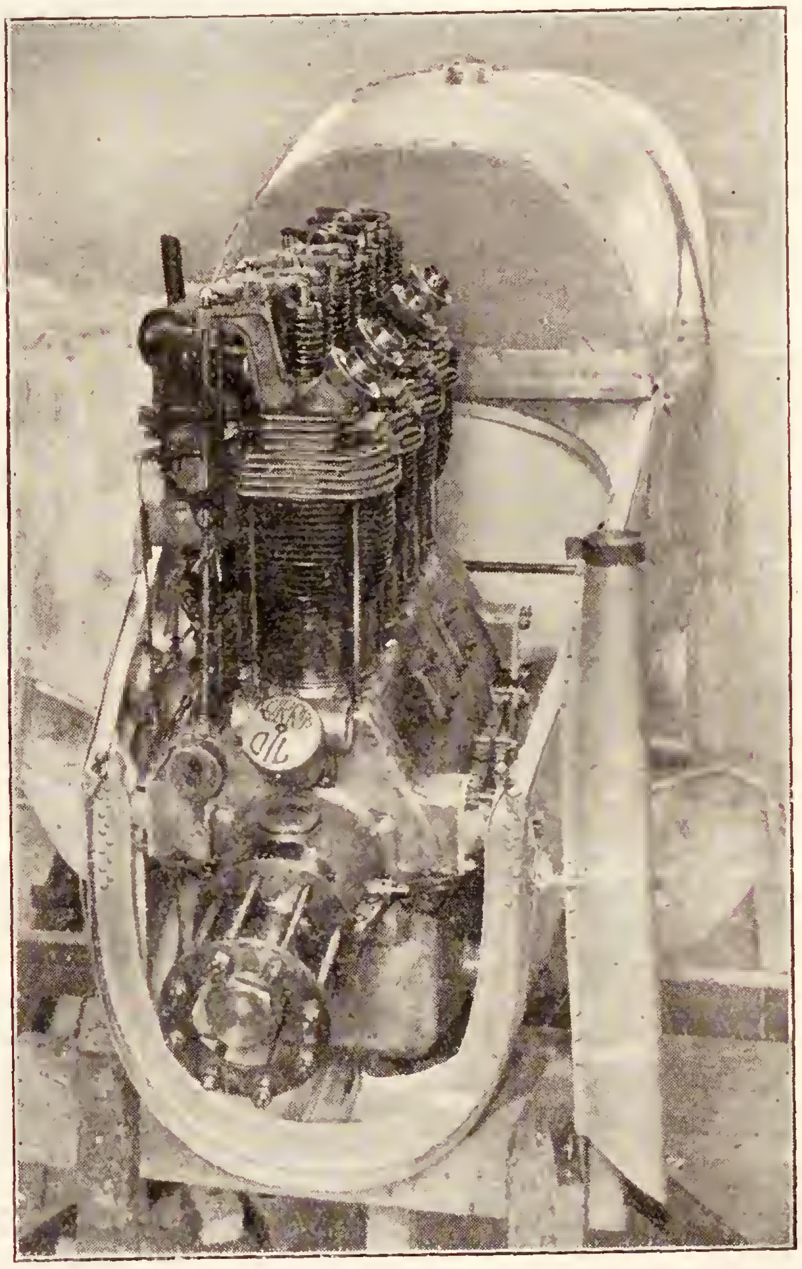
A Training Machine With 65-H.P. " Cirrus " Engine

In many ways one of the most interesting low-power machines of recent years, the Short " Mussel," or S.7, to give it its official designation, has been expressly designed for use as a light training machine of robust and simple construction. In the general arrangement drawings published herewith the machine is shown as a seaplane, and this is to be the first form in which the " Mussel " will appear. Provision is, however, made for turning the " Mussel " into a landplane by substituting a wheel undercarriage and a tail skid for the twin-float undercarriage shown in the drawings. The engine fitted is an A.D.C. " Cirrus " four-cylinder air-cooled, developing a maximum of 65 b.h.p., similar to the engine fitted in the De Havilland " Moths " used by the British light 'plane clubs.



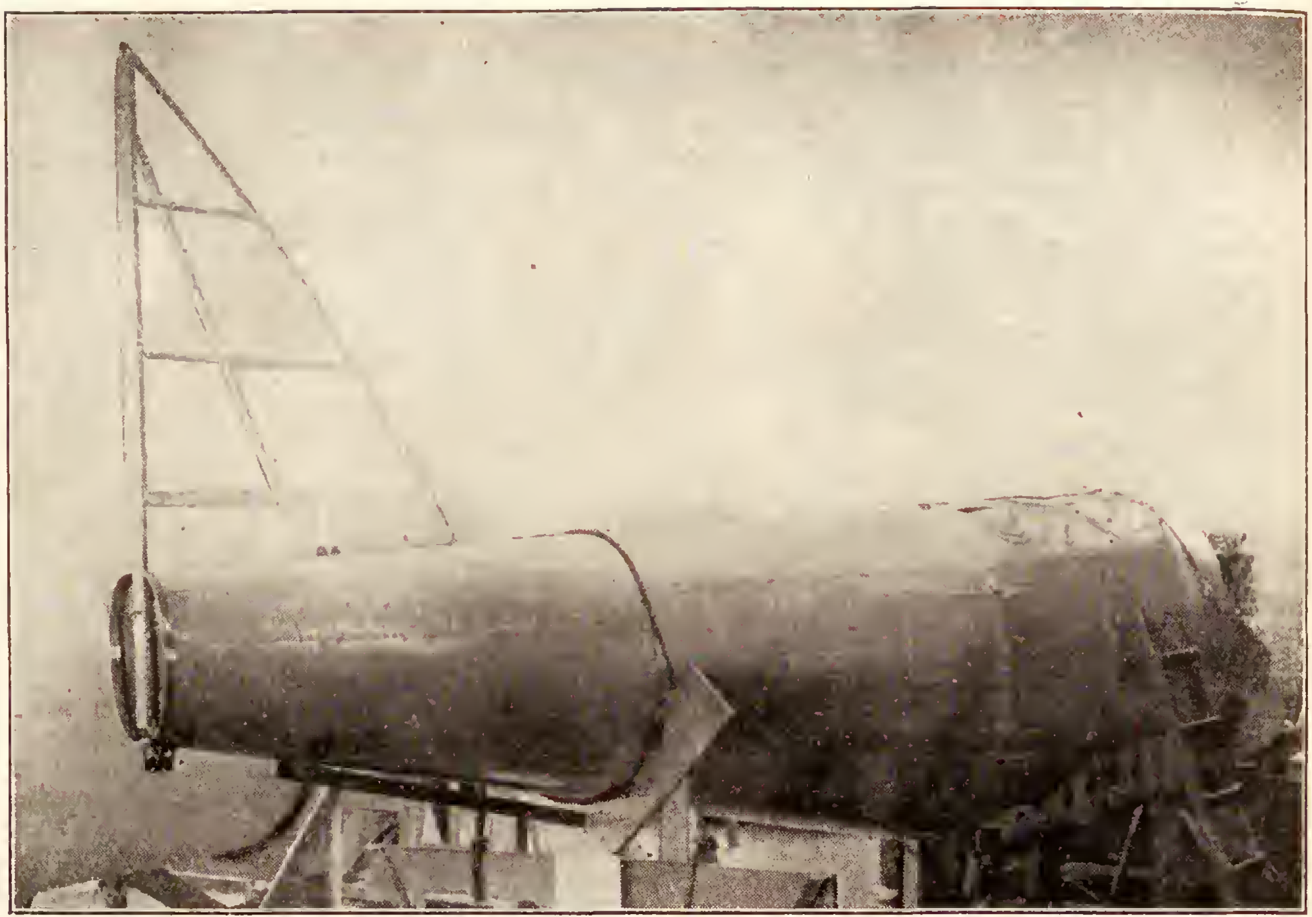
THE SHORT " MUSSEL " : This photograph of the stern of the fuselage shows the neat attachment of the fin and stern post to a Duralumin plate forming the rear bulkhead of the fuselage. Note the steel fittings under and on the sides of the stern, which are for the tail skid and tail plane struts respectively. The skid is, of course, for use with the landplane only.

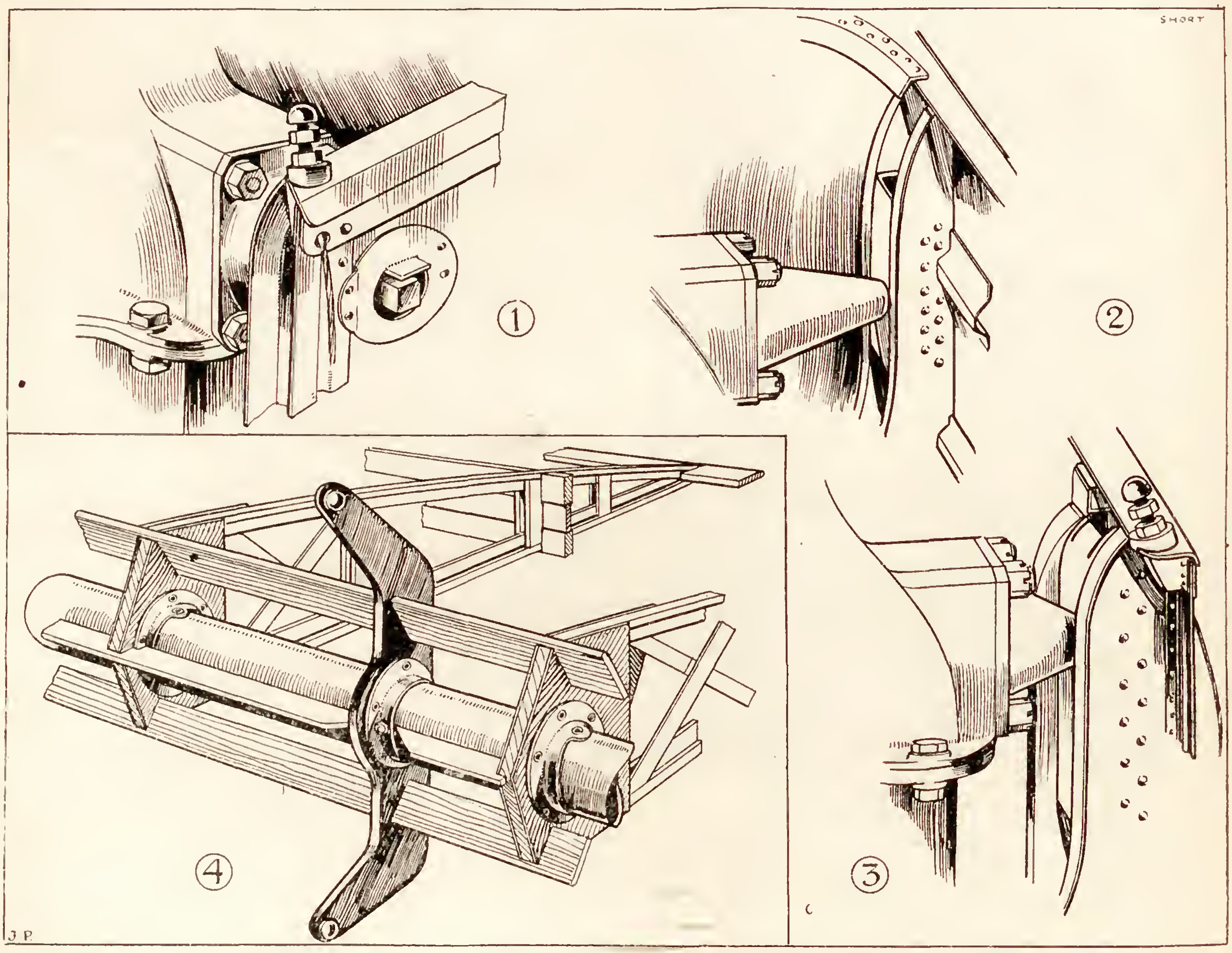
It may be recollected that at the last two Lympne meetings an all-metal light monoplane known as the Short " Satellite " took part. The Short " Mussel " may be said in a way to be a development of that machine, although differing from it in many respects, particularly in the general arrangement and in the details of the wing design and construction. Whereas the Short " Satellite " was a cantilever monoplane with the wing attached approximately half-way up the sides of the fuselage, the Short " Mussel " is a low-wing monoplane and the wings are of the semi-cantilever type, with compression struts running from a point about one-third of the wing out from the fuselage to fittings on the sides but towards the top of the fuselage structure. Constructionally the " Mussel " differs from the " Satellite " in that, whereas the latter had fabric-covered wooden wings, the " Mussel " has metal spars and wood ribs, the whole fabric covered. The fuselage construction is practically identical in the two machines and is of the type originated and developed by Short Brothers during the last six or seven years, in which a sheet Duralumin skin is employed as part of the stress-resisting structure, the sheets being riveted to hoops or formers of L-section and built-up channel-section construction. There are no longitudinal



THE SHORT " MUSSEL " : The neat mounting of the " Cirrus " engine is well brought out in this photograph. The gravity petrol tank may be seen above and aft of the engine.

The Short "Mussel": A view of the fuselage, showing the skeleton of the vertical fin.





THE SHORT "MUSSEL": 1, 2 and 3 show details of the very neat engine mounting, the cone-shaped "feet" being bolted to the channel-section formers and secured by bolts projecting through the fuselage covering and readily accessible from outside. Taken in conjunction with the photograph showing the "Cirrus" engine, these sketches clearly explain the simple mounting. In 4 are shown details of the aileron construction, which incorporates wooden ribs attached to a Duralumin tubular spar by the small Duralumin sheet fittings shown.

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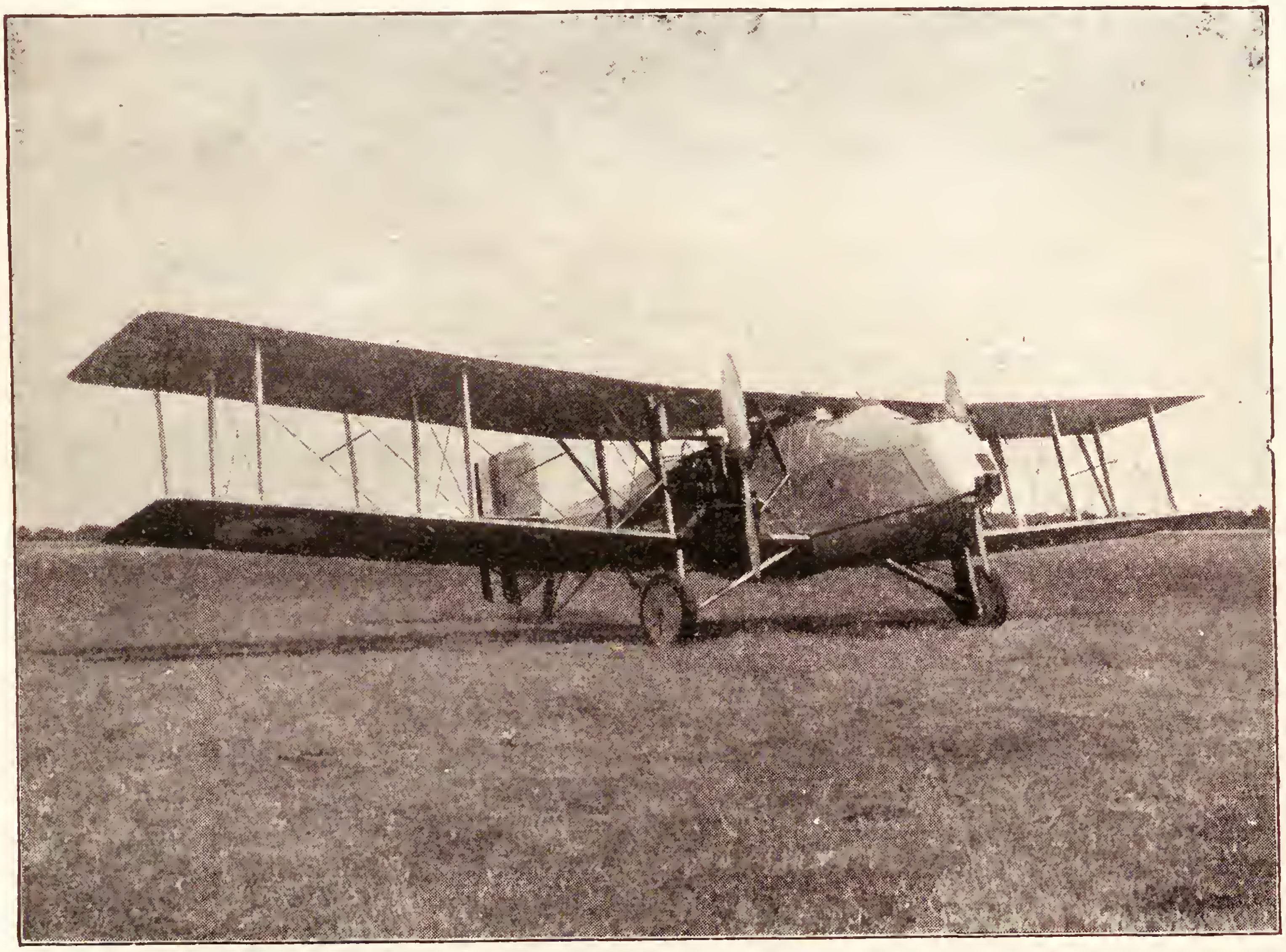

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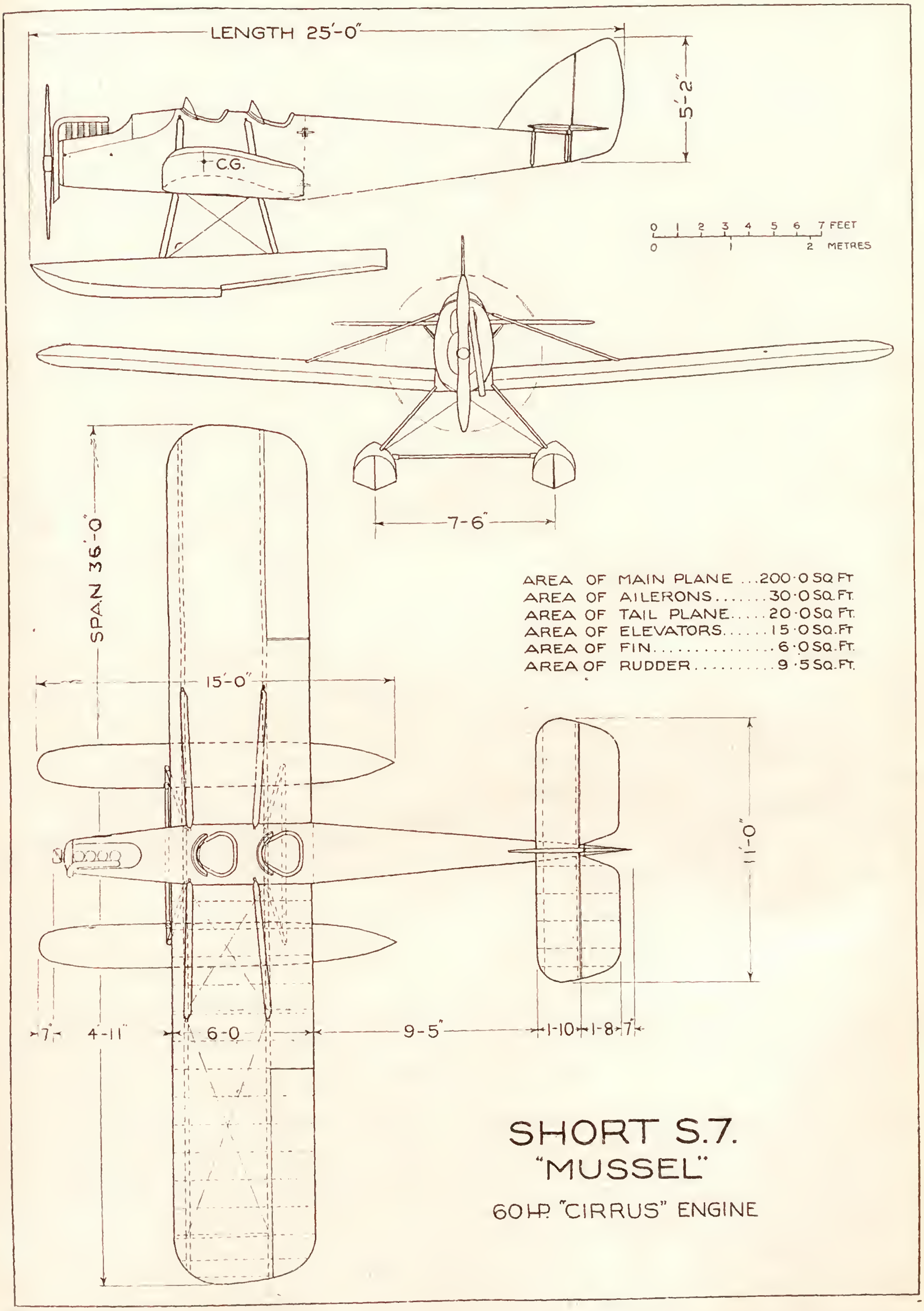
LENGTH 25'-0"
5'-2"
C.G.
0 1 2 3 4 5 6 7 FEET
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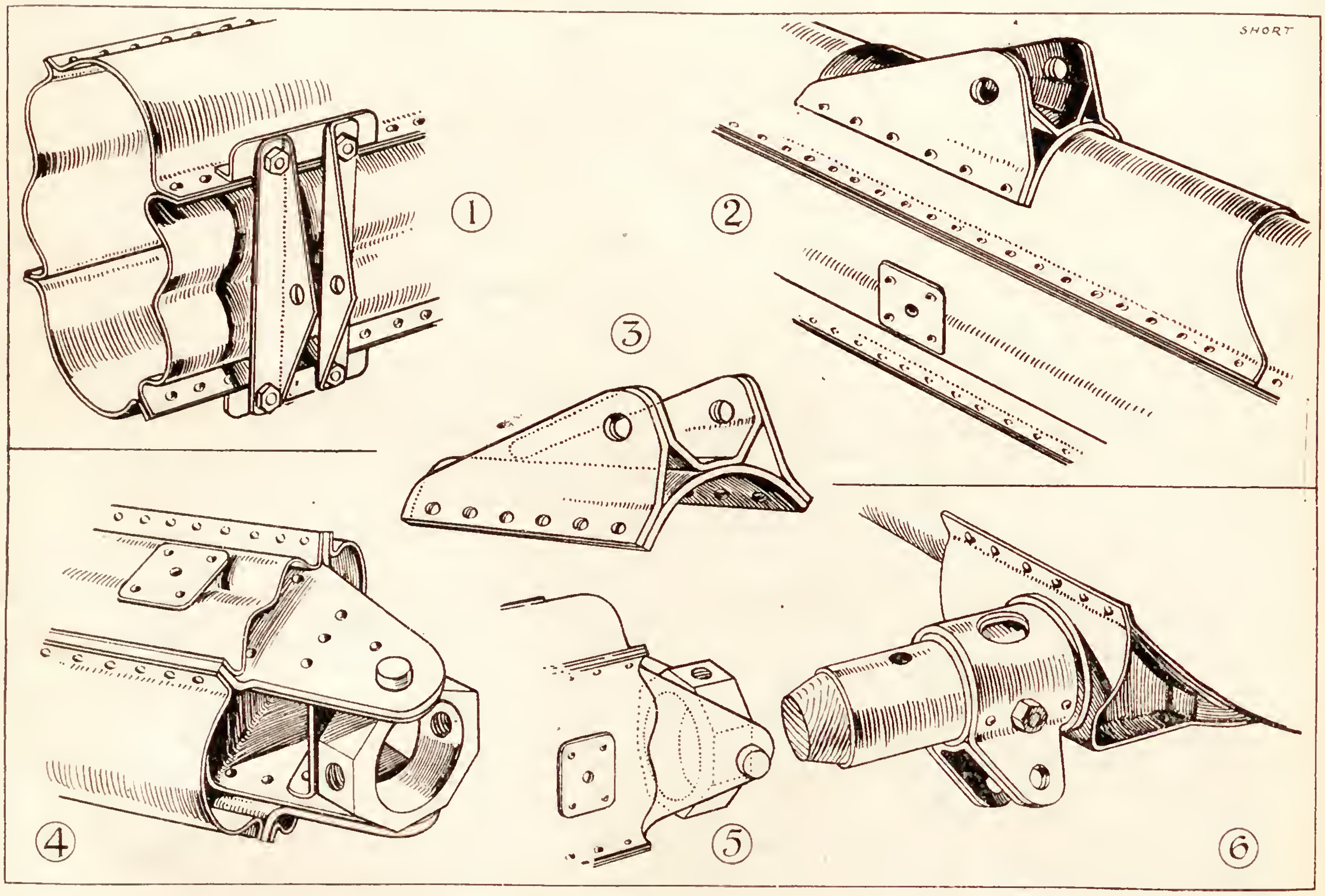
7-6"
SPAN 36'-0"
AREA OF MAIN PLANE ...200·0 SQ FT
AREA OF AILERONS.......30·0 SQ.FT.
AREA OF TAIL PLANE.....20·0 SQ FT.
AREA OF ELEVATORS......15·0 SQ.FT
AREA OF FIN...............6·0 SQ.FT.
AREA OF RUDDER..........9·5 SQ.FT.
15'-0"
11'-0"
7"
4-11"
6-0
9-5"
1-10
1-8
7"
SHORT S.7.
"MUSSEL"
60 H.P. "CIRRUS" ENGINE

THE SHORT "MUSSEL," 65 H.P. "CIRRUS" ENGINE: General arrangement drawings, to scale.

members running right through the fuselage, the short V-section stringers being interrupted at the formers and riveted to the skin. These longitudinal members are placed at intervals around the circumference of the fuselage, and merely serve to stiffen the skin against compression loads. Tensile loads are, of course, taken by the skin itself, or, more correctly speaking, by the rivets attaching the separate small plates of the skin to the hoops and to one another. The resultant structure may be regarded as a tapering tube of oval cross-section, which should not only be very efficient aerodynamically, but should also be remarkably strong, particularly in torsion. There are several advantages, apart from the general advantages of metal construction, in the particular form of fuselage construction used by Short Brothers. From a manufacturing point of view, the fact that there are no stringers running through the whole fuselage means that parts of the fuselage could be manufactured and got ready for erecting in quite small shops. In the case of a small machine like the "Mussel" this is perhaps of minor importance, but when it comes to building hulls for very large flying-boats, in which a fundamentally similar construction is employed, this saving in space is by no means negligible, and the only shop which requires to be of large size is that in which the machine is erected. Another advantage would seem to be that in case of damage a fuselage of the Short type can probably be more easily repaired than one in which there are longitudinal members running through, since the damaged section can be removed and a new one put in its place without interfering with the rest of the fuselage.



THE SHORT "MUSSEL": Some constructional details. 1, shows a spar section, and also the attachmen of an aileron bracket. In 2 is seen an external view of a spar, with the built-up sheet steel fitting which takes one of the lift struts. The latter are placed above the wing, and are thus compression struts. The steel fitting is shown in more detail in 3. A spar root is illustrated in 4. Note the gimbal mounting. In 5 is shown the spar root, built into the lower part of the fuselage, which, in addition to receiving the wing, also supports the undercarriage strut.

In order to facilitate internal inspection and painting, as well as transport, the fuselage is built in two sections, the tail portion being detachable immediately aft of the rear cockpit. The two cockpits are arranged in the usual way one behind the other, each being provided with the usual stick and foot-bar controls. One of the sticks, however, is made instantly detachable, so that when the machine is not being used for training purposes the stick can be removed and placed in clips inside the fuselage out of the way of the passenger. In front of the cockpits is a fire-proof bulkhead separating the front cockpit from the engine, and the central portion of the fuselage is of particularly robust construction, since it is at this point that all heavy loads ars concentrated. Two of the fuselage hoops or formers are specially reinforced to receive the attachment for the two halves of the monoplane wing, and also, at the same points, the attachments for the undercarriage struts. One of these fittings is shown by a sketch.

The "Cirrus" engine is mounted in a particularly neat fashion in the nose of the fuselage. The standard "feet" of the engine have been removed, and another set of feet designed and made at the Short works. These also are illustrated by sketches, and it will be seen that they are of conical shape, with the apex of the cones resting against the bottom of the trough or channel-section formers, the square-headed bolts securing the feet of the formers projecting through the fuselage covering, so as to be readily accessible from outside. The mounting is one of the neatest we have yet seen, and is well illustrated by the sketches and by a photograph. The petrol tank is mounted aft of the engine and faired into the shape of the fuselage, at the same time being placed sufficiently high above the carburettor to give direct gravity feed. The tank has a capacity of 15 gallons, which is sufficient for an endurance of 4 hours at cruising speed.

The wing construction is of particular interest, since the main spars are of the latest Short type, being built up of laminations of Duralumin sheet, pressed out to corrugated sections. The construction of the spars may be gathered from an inspection of some of our sketches. By employing laminated flanges, all the strips can be pressed out in fairly light gauge material, and the necessary local strength obtained by gradually adding laminations to the top and bottom flanges, the laminations of course becoming shorter and shorter as the point of maximum stress is approached. With the form of wing construction employed this point naturally occurs at the point of attachment of the wing bracing struts,

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COLLECTION

and here, in fact, the spar flanges show several thicknesses of material. In order to avoid a too sudden change of section the ends of the laminations are sloped and bevelled so as to make the transition, for example, from four laminations to three laminations, a fairly gradual one.

The drag bracing consists of drag struts secured to the spar webs by bolts passing through both webs of the spars, and by the usual diagonal drag bracing. The fittings for the wing bracing struts are of particularly neat design, those for the front struts being built up from sheet steel into the form shown in a sketch. The curved portion of the fitting rests on the top flange of the spar, to which it is riveted, the whole making an exceptionally neat job. The rear spar fitting is somewhat similar, but is rather lighter. The inner ends of the wing spars are attached to the fuselage by a form of gimbal mounting, also illustrated in a sketch. Vertical bolts pass through the spar roots, and when once the wing bracing struts are adjusted for length no trueing up of the wings is required.

The wing ribs in the "Mussel" are of the lattice type, and in the first machine they are made of wood, although it is possible that in later machines Duralumin ribs will be used. The wing section employed is the new R.A.F. 32, which is a thick section with practically stationary centre of pressure. As far as we are aware this section has not hitherto been tested full scale, so that the Short "Mussel" provides an instance of using a low power machine for research purposes, apart from its direct usefulness as a machine. Should it be found that on the full scale R.A.F. 32 does not bear out the model tests, it will only be a matter of making a set of new ribs of different section, to be slipped over the existing spars.

The undercarriage of the "Mussel" seaplane is of the twin float type, and the floats are, like the fuselage, built up of Duralumin sheet riveted to L-section and channel section formers. Constructionally the floats are very similar to those used on the British Schneider Cup machines at Baltimore, which proved to stand up remarkably well to the hard pounding which they received. The floats are of the single step V bottom type, with domed tops. Bulkheads riveted to the formers and skin divide the floats into watertight compartments with suitable inspection covers, and the buoyancy of the floats is such that the displacement of each float is sufficient to support the machine. Watertight axles are built into the floats to take detachable wheels provided for beaching purposes. The undercarriage is completed by steel struts, pin-jointed to the fuselage and readily detachable and interchangeable with the land type chassis.

The land undercarriage is of simple design and is of the type employing rubber blocks working in compression, and giving long travel.

Considering the relatively low power of the engine, it is somewhat of an achievement to have produced a two-seater machine of the seaplane type in which the surplus of power required to get over the hump speed is necessarily rather greater than the power required for a land machine. Nevertheless, it is not expected that there will be any difficulty in getting the machine to unstick, especially as exhaustive tests on models of floats have been carried out in the large tank forming part of Short Brothers' equipment at Rochester.

The main dimensions, etc., are shown on the general arrangement drawings. Following are the main characteristics of the Short "Mussel": Weight of machine empty, 907 lbs.; weight fully loaded, 1,400 lbs.; available load, 493 lbs., made up as follows: crew, 320 lbs.; instruments, 18 lbs.; 15 gallons of petrol, 110 lbs.; 1½ gallons of oil, 15 lbs.; luggage, 30 lbs. The wing area is 200 sq. ft., giving a wing loading of 7 lbs. per sq. ft. With a power loading of 23·3 lbs. per h.p., the following performance is estimated: maximum speed at sea level, 82 m.p.h.; cruising speed, 65 m.p.h.; landing speed, 44 m.p.h. Range at cruising speed, 260 miles, and endurance at cruising speed, 4 hours. The machine will be finished shortly when we hope to publish photographs.

AIRCRAFT AND THE NAVY ESTIMATES

IN a statement on the Navy Estimates issued on February 27, by the First Lord of the Admiralty the following references to aircraft were made.

The number of Naval and Marine officers trained and employed as pilots now amounts to 70, and 42 are still under training. The first of the Naval officers attached to the Royal Air Force under the scheme approved by H.M. Government in 1923 have now completed their full training as pilots, and have been appointed for duty afloat. The appreciation of the Board of Admiralty has been expressed at the very satisfactory results obtained during their training. Arrangements have been made for all executive officers to undergo a short course in elementary naval aeronautics in an aircraft carrier, either during the last year of their service as midshipman or at the first opportunity subsequently as junior commissioned officer. Such arrangements will, it is hoped, increase the interest taken by junior officers in the work of the Fleet Air Arm, and will be of considerable value to them later, even should they not decide to specialise in air duties.

All the R.A.F. aircraft hands for general duties in the Fleet Air Arm have been replaced by R.N ratings. These substitutions have resulted in economies in that they have enabled the total complements of aircraft carriers to be substantially reduced, since the naval ratings are available for and capable of undertaking ships' duties which the replaced airmen were not trained to perform.

Successful trials in launching aircraft from a catapult on the *Vindictive*, which has proceeded to the China station.

An appreciable economy has been effected by accepting, for the time being, a lower percentage of aircraft reserves.

Special courses in aerial navigation, meteorology and photography for selected R.N. observers have been instituted and a programme of practices in aerial fighting under sea conditions has been introduced for all Fleet Air Arm pilots and observers.

Steady progress in the use of aircraft by the Fleet is indicated by reports received from sea.

The subject of anti-aircraft gunnery continues to receive great attention. There is naturally a check in the acceleration of progress, while the material recognised as essential is being supplied, but the benefit of the investigations in this direction will be more fully reaped next year.

SIR SAMUEL HOARE AT OXFORD

ON March 5 Sir Samuel Hoare, accompanied by Air Vice-Marshal Sir I. L. Vesey and Col. M. C. Drummond, inspected the hangars, equipment, and appliances of the University Air Squadron at Oxford. Just recently formed this squadron has a membership of 27 undergraduates, who receive instruction and carry out practical work at their headquarters in Manor Road, Holywell. Headquarters include an aeroplane hangar (together with a Bristol Fighter), and a workshop hangar containing various types of modern aero engines, instruments, etc. Instruction is given in aeroplane engines, the construction and rigging of aeroplanes, wireless telegraphy and telephony, air pilotage, aerial photography, armament, and aeroplane navigational instruments.

During term no flying is carried out, but a fortnight is set aside at the beginning of long vacation, when the squadron will operate as a unit at a service aerodrome.

In proposing the toast of success to the Oxford University Air Squadron at a luncheon held in Exeter College Hall, Sir Samuel said that while the idea of forming the two University (Oxford and Cambridge) Squadrons took shape a few months ago, he thought that he could claim that the Air Ministry had not wasted any time in providing the buildings and the necessary organisation for this very interesting experiment. They could never have formed the squadron in so satisfactory a way, much less so quickly, if it had not been for the great help that the University had given them.

The squadron had been formed for three reasons. First, they hoped it would make the connection closer between the Air Force and the University than it had ever been before, and as an outward sign of this close alliance that it would result in an increase in the number of University candidates for commissions. Secondly, it would give instruction to some of the many members of the University who were interested in the technical side of aeronautics, and thirdly it would provide some further opportunity for any who wished to do some original research work in the ever widening field of aviation. They must try to counteract the destructive power of the aeroplane in war by its development for the purposes of peace. It was on that account that he was anxious to make this flight with the new squadron in the humane atmosphere of Oxford, and to bring their work into touch with the life and thought of the University.

LIGHT 'PLANE CLUB DOINGS

London Aeroplane Club

February was a good month for flying. Flying instruction was given to the members on 23 days during the month; 177 flights were made, of which 126 were dual, 29 solo, and 22 test. All these flights were made on the one D.H. "Moth" G-EBLI.

For the week ending March 7, the total flying time was 20 hours 10 minutes.

The following members had flying instruction:—G. Quirk, T. W. Eady, A. R. Ogston, J. H. Saffery, E. A. Cook, W. Hay, P. G. Lucas, G. H. Craig, K. V. Wright, Major K. M. Beaumont, T. H. O. Richardson, O. J. Tapper, E. S. Brough, B. B. Tucker, R. C. Presland, Mrs. Eliott-Lynn, Sir John Rhodes, E. D. Moss, L. Anderson, R. Malcolm, J. C. Barros, G. N. Howe, R. P. Cooper, J. S. M. Michie, G. Vlasto, M. A. Douglas Hamilton.

The following members did solo flying:—N. H. Jones, Mrs. Eliott-Lynn, Major K. M. Beaumont, G. N. Warwick, Sqdn.-Leader M. E. A. Wright.

On March 1, N. H. Jones successfully passed the tests for his aviator's certificate.

On March 2, D. H. Kittell, who has recently acquired a D.H. "Moth" of his own, went up to carry out the tests for his certificate. During the height test the weather clouded over and he was obliged to make a landing in Essex. Having ascertained his direction, he flew back to the aerodrome later in the afternoon.

Mrs. Eliott-Lynn has recently gone through the technical examination for a "B" licence. The examination was conducted by Air Ministry officials, and Mrs. Eliott-Lynn has been notified by the Air Ministry that she has successfully passed in the subjects of navigation and meteorology, also in the examinations on flying machines, engines, and instruments in relation to the D.H. "Moth" type.

The following donations have been promised towards the third D.H. "Moth" machine which has been ordered for the London Aeroplane Club:

Petroleum distributing companies, £200; E. J. Jones, £150; Lieut.-Colonel M. O. Darby, £50; Lieut.-Colonel J. Barrett-Lennard, £50; Sir John Rhodes, £25; Major K. M. Beaumont, £20; W. Hay, £20; Mrs. S. C. Eliott-Lynn, £10; E. S. Brough, £5; D. Kittell, £5; J. S. M. Michie, £3; Sqdn.-Leader M. E. A. Wright, £2; G. Quirk, £2; E. A. Cook, £2; G. H. Craig, £2; A. R. Ogston, £1; G. N. Warwick, £1; J. H. Saffery, £1; R. C. Presland, £1; T. H. O. Richardson, £1; T. W. Eady, £1; P. G. Lucas, £1; O. J. Tapper, £1; K. V. Wright, £1. Total to date, £555.

The Lancashire Aero Club

Owing to gales and high wind, flying has been possible on only Tuesday, Friday and Sunday, and even on those days for very short intervals. Mr. Stack gave instruction to H. Hardy, 1 hour; C. Agar, 1 hour 30 mins.; B. Smith, 1 hour 50 mins.; R. Wade, 50 mins.; D. Dyson, 10 mins.; C. Brown, 20 mins. Mr. Cantrill gave dual to S. Parker, 30 mins.; J. Leeming, 25 mins.; solo flights by A. Goodfellow, 30 mins.; M. Lacayo, 1 hour 15 mins.; J. Cantrill, 25 mins. Total dual, 6 hours 35 mins. Total solo, 2 hours 10 mins. Tests occupied 1 hour 10 mins. Total time flown, 9 hours 55 mins. Machines in use G-EBLV and G-EBMQ.

The third annual general meeting was held in Manchester on March 2, and the following elected to act as committee for the year: Messrs. A. Goodfellow, J. Cantrill, J. Scholes, R. Williams, H. Stern, J. Leeming, T. Prince, H. Grant, M. Lacayo, Mr. Wood remains as Secretary and Mr. Leeming as Chairman.

It was announced that owing to the generosity of Colonel Groves, work on the hangar was to be commenced at once. A proper hangar is the club's greatest need, and this assistance from Colonel Groves was most acceptable.

A special tribute was paid to the work done voluntarily by Messrs. Cantrill and Scholes as instructors. These gentlemen went to Upavon for the instructors' course, and have been at the aerodrome teaching pupils every week-end since September, busy men who have to travel from the other side of Manchester to Woodford, this must have been a great call on their spare time, and members realising this, expressed their appreciation most enthusiastically.

Tickets for the dinner-dance at the Midland Hotel on March 12 are now entirely sold out, and money is being returned to all members applying after March 6.

The Newcastle-upon-Tyne Aero Club

Report for week ending March 7:—Total flying time, 10 hours 35 mins., made up of dual instruction with Major Packman, 8 hours 15 mins.; solo ("A" pilots), 1 hour 15 mins.; passenger, 1 hour 5 mins.

It blew a gale throughout the week and from Monday to Thursday inclusive was added heavy snow storms, and during the first four days of the week only two hours' dual was possible, one hour each Monday and Thursday. Except for a short period early on Saturday and Sunday mornings, no solo flying was attempted. Only one machine is on service at present.

The following members flew under instruction:—Miss Leathart, Mrs. Marcks, Mr. Twine, Mr. Peacock, Mr. C. Thompson, Mr. Campbell, Mr. Bainbridge, Mr. W. Todd, Mr. Bruce.

Passengers, Mr. Davidson, Mr. Penrith, Mr. Grundy.

Solo, Mr. W. Baxter Ellis and Mr. R. N. Thompson.

On Friday, unfortunately a quiet day at the aerodrome at all times, Mr. Ellis took out the "Gull," but as the instruments are not yet fitted and on account of the strong wind, which, however, was not as bad as on the other days of the week, he confined himself to a couple of "straights." Mr. Heppell and Major Packman also had a straight each. It was impossible owing to the strength of the wind to taxi back after a flight and the machine had to be wheeled back across the aerodrome on each occasion, reminiscent of flying about 1909. Altogether it is a very wonderful machine, and those who found much in it to cause amusement when it was first delivered, in a dismantled condition, are either openly converted or discreetly silent.

Report for the month of February: Unfavourable weather was again the rule during February, but it is highly satisfactory that Newcastle is once more able to claim the largest aggregate of hours flown among the clubs. Details are as follows:—

	Flights.	Hours.	Mins.
Dual instruction	91	50	43
Solo training	4	1	15
Pilot members' solo	23	13	27
Test and passenger	11	2	50
Totals	129	68	15

During nine of the flights by pilot members, totalling 4 hours 29 mins., members and visitors were carried as passengers.

Two members, Miss C. R. Leathart and Mr. T. R. MacMillan, were passed out for solo flying during the month.

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At St. James's Palace

At the Levee held by His Majesty the King at St. James's Palace on March 3, the following were amongst those presented to the King:—Flight-Lieut. C. T. Anderson, D.F.C., Flying-Officer G. C. A. Armstrong, Flight-Lieut. D. Carey, Squadron-Leader Wm. Coryton, M.V.O., D.F.C., Group-Capt. P. Fellowes, D.S.O., A.D.C., Squadron-Leader A. Glenny, M.C., D.F.C., Flight-Lieut. R. Houghton, A.F.C., Flight-Lieut. H. Junor, D.F.C., Flight-Lieut. G. Knocker, Air Vice-Marshal D. Munro, C.B., C.I.E., M.B., Wing-Commander G. Reid, D.S.O., M.C., Flight-Lieut. A. Rowan, Flying-Officer G. Smith, Wing-Commander W. Welsh, D.S.C., A.F.C., etc. Amongst those in attendance were: Air-Marshal Sir John Salmond (Principal Air Aide-de-Camp), Wing-Commander L. Greig, Wing-Commander J. C. Halahan, etc.

The Bristol "Jupiter" Endurance Test

The endurance test of the Bristol "Jupiter" engine, which, fitted in a Bristol "Bloodhound" biplane, has been making trips almost every day between Filton (Bristol) and Croydon since January 4 last, has now been brought to a close, as the 25,000 miles' flight which was aimed at when the test opened has now been accomplished. In point of fact the period run was 225 hrs. 54 mins. and the distance covered was 25,078 miles. The final run was a non-stop flight from Bristol to London and return. The whole test has been completed without a single one of the seals affixed by the Air Ministry officials at the outset having been disturbed, which means that there has not been a single replacement or adjustment throughout the entire period. This is a record which, we believe, has never previously been approached by any aero engine of any type in any country. The petrol consumption, 21·9 gallons per hour, and the oil consumption, 3·95 pints per hour, are also remarkably low. The engine was running full well at the completion of the test, but the pilot, Col. Minchin, expressed keen disappointment at the discontinuance. It was felt, however, that the original idea should be adhered to, as there will be a good deal of practical interest in the inspection of the parts of the engine after stripping. When one bears in mind that the "Jupiter" engine is perhaps the lightest proved engine of its power in the world, weighing only about 1½ lbs. per horse-power, the merits of this performance can be better appreciated. The test has been officially controlled throughout by officials of the British Air Ministry and the whole of the piloting has been undertaken by two of the leading Imperial Airways pilots, Capt. Barnard and Col. Minchin.

The British Rigid Airships

Last week we announced that work would soon commence on one of the 5,000,000 cub. ft. rigid airships—which we designated in error as the "Burney" airship, R.101. As a matter of fact, the Air Ministry vessel, which is being constructed at Cardington, Bedford, is known as R.101, while the airship, for which the Airship Guarantee Co.—or Commander Burney and Vickers, Ltd.—are responsible, is known as R.100, and it is to this vessel we referred.

The Royal Air Force Memorial Fund

The fortnightly meeting of the Grants Sub-committee of the Fund was held at Iddesleigh House on March 4. Mr. W. S. Field was in the chair, and the other member of the Committee present was Squadron-Leader E. B. Beauman. The Committee considered in all 12 cases, and made grants to the amount of £72 3*s*. 3*d*. The next meeting was fixed for March 25 at 2.30 p.m.

French Trawler Rescues British Aviators

One of the Fairey IIId seaplanes of the Lee-on-Solent School of Naval Aviation recently crashed in the Irish Sea and the occupants, Flying-Officer L. G. A Kirschner and Lieuts. R. G. Baker and J. D. Harvey, R.N., were on the point of being drowned when their danger was observed by the French trawler *Louise Marguerite*, of Boulogne (Capt. M. Jean-Baptiste). Two of the crew set out in a small boat and with great difficulty succeeded in rescuing the three British officers, one of the French sailors, Eugene Deseigne, receiving injuries during the operation. The British destroyer *Champion* came up later and rendered medical attention, and afterwards the injured sailor was taken to hospital at Penzance. The bravery of the French sailors has been brought to the notice of the British Admiralty.

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THE FINANCIAL TIMES
on 8th January, 1926

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THE AFRICAN FLIGHTS

MR. ALAN COBHAM (accompanied by Mr. Elliott and Mr. Emmott) has successfully completed the return flight across Africa, from south to north, and has, as originally intended, covered the 5,830 miles with true Cobham hustle. Thus, he flew from Cape Town to Cairo in nine-and-a-half days, and if it had not been for one or two irritating delays caused by tropical rainstorms and sandstorms, he would have done even better. Last week we left Mr. Cobham at work with his native " Palais de Dance " scheme for hardening the sodden aerodrome at N'Dola, which apparently succeeded, for on March 2 he managed to get away as far as Abercorn where the night was spent. On the following morning they proceeded to Tabora, flying over the world's highest waterfall at Kalambo *en route*. Mud again gave trouble at Tabora, but they managed eventually to get away after refuelling and reach Kisuma the same day.

On March 4 a 4½-hours' flight to Mongalla was accomplished, and after a short rest there, the day's 800 miles was completed at Malakal. During this stage Cobham stated that the heat was appalling, but that the D.H.50J and the Armstrong Siddeley " Jaguar " stood it well. The next day they hurried on to Khartoum, and troubles commenced again. Proceeding on March 6, during a lull in a violent sandstorm, they climbed, first to 5,000 ft. then to 11,000 ft., in order to clear the dust-laden air, but not with any great success. Visibility was practically nil, and only a ghost of the Nile—their only guide—was seen (occasionally). Thus, with a short stop at Atbara, and with a head wind against them, they accomplished a nightmare flight of nearly 800 miles and nine hours' flying to Assuan—once being completely lost over the desert.

Sunday was truly a day of rest, for with the wind behind them they covered the 480 miles to Cairo in 4 hrs. 40 mins. However, more sandstorms prevented them from proceeding to Sollum until March 9, and here we must leave them until " our next."

In the meanwhile the R.A.F. flight of Fairey III.D's (Napier " Lions "), under Wing-Commander C. Pulford, was making good progress in the opposite direction. On March 3 they arrived at Atbara from Assuan, stopping at Wady Halfa on the way. Khartoum was reached on March 4, and on March 6 they proceeded to Kosti, where they had to land owing to a sandstorm, which held them up until March 8, when they flew on to Malakal.

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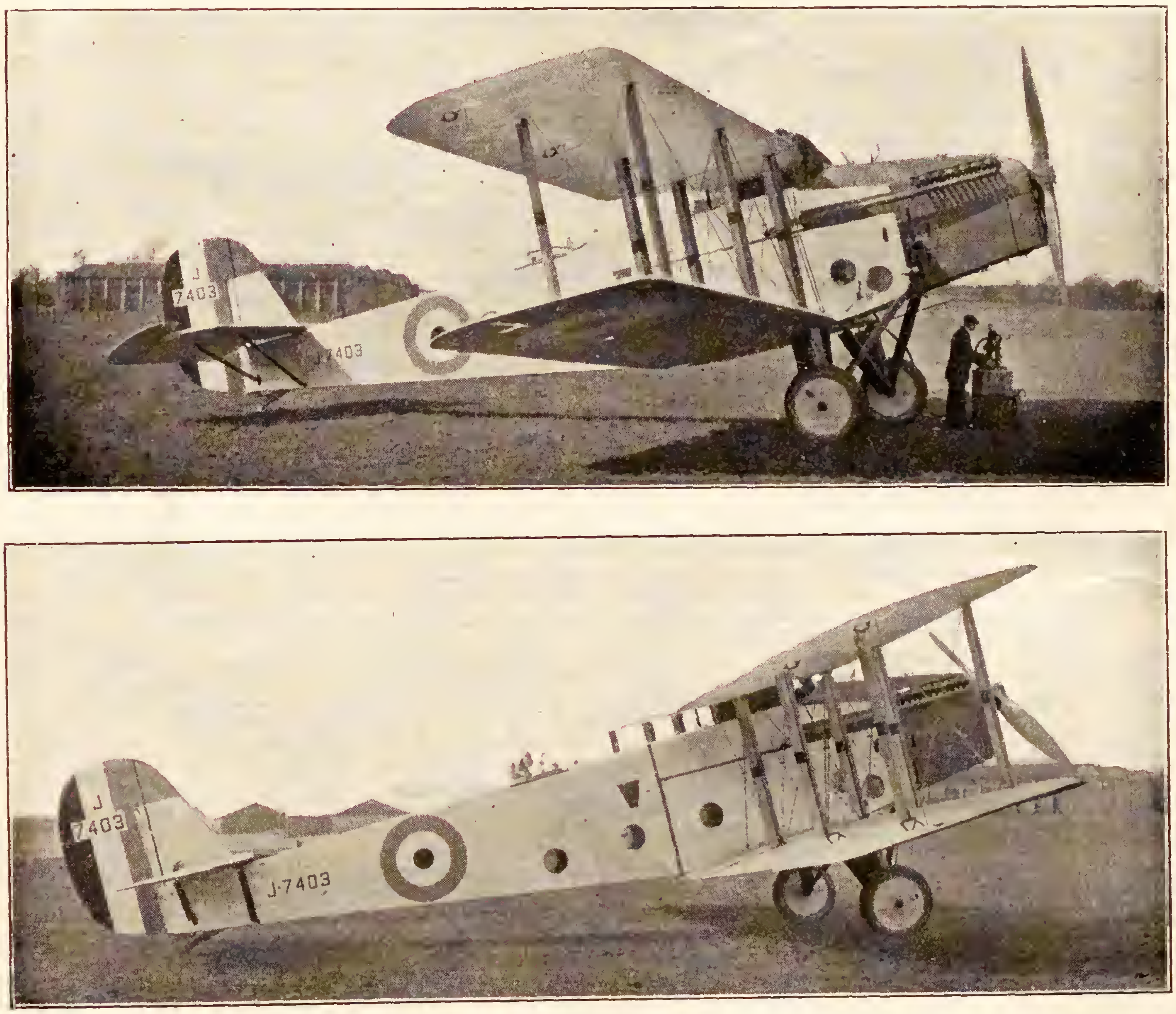
AN ARISTOCRAT



The Bristol " Berkeley " is a day bomber fitted with Rolls-Royce " Condor " Engine. The machine is of all-metal construction, with steel as the material used for the main structure members and Duralumin for minor parts. For the Bristol-Frise patented balanced ailerons it is claimed that they introduce no yaw to interfere with the sighting of the bomber. The pilot's cockpit is placed ahead of the wings, where his view is particularly good.

AMERICAN AERONAUTICS[*]

(*Concluded from page* 98)

OWING to lack of space it has not been found possible to publish until now the concluding instalment of our article on "American Aeronautics," which was commenced in our issue of February 18, 1926. The first article dealt with the general constitution and organisation of the American National Advisory Committee for Aeronautics, and a commencement was made by referring briefly to the work done during 1925 by and on behalf of the Sub-Committee on Aerodynamics at the Langley Memorial Aeronautical Laboratory, where most of the aerodynamic research work is carried out, at Stanford University, at the Washington Navy Yard, at the Bureau of Standards, at the Massachusetts Institute of Technology, and at McCook Field. The following notes deal briefly with the work of two other sub-committees, viz., that on power plants for aircraft, and that for aircraft materials.

The Committee on Power Plants for Aircraft, it might be mentioned, has direct control of the power-plant research conducted at Langley Field, and also of special investigations authorised by the Committee and conducted at the Bureau of Standards.

At the Langley Memorial Aeronautical Laboratory the study of the application of fuel injection to the two-cycle engine with spark ignition has been continued and brought to a conclusion. The induction system of the Liberty engine cylinder was further modified, which gave improved results. The study did not include design development necessary to promote satisfactory operation at low speeds and loads. It was found that 53 b.h.p. could be consistently developed with the modified Liberty cylinder at 1,300 r.p.m. (116 lb./sq. in. B.M.E.P.) using a scavenging air pressure of 5½ lbs. per square inch. Only 28 b.h.p. is obtained with the standard Liberty engine at the same speed.

The application of fuel injection to four-cycle aero engines operating with Diesel engine fuel oil and using the heat of compression for ignition, has been further studied. A special steel cylinder has been used to study combustion chamber forms. A pre-combustion or bulb type cylinder head has been tested at speeds up to 1,800 r.p.m., using an eccentric-operated pump, and an automatic diaphragm type injection valve. Brake mean effective pressures up to 88 lbs. per square inch and fuel economies comparable to those of present-day aircraft engines have been obtained with an injection advanced angle of approximately 27° before top dead centre. A limited number of tests have been made to determine the effect of variation of the injection rate on the power output and fuel economy. A second head of slightly concave cross-section and arranged for injection of fuel directly into the cylinder is being tested. A cam-operated fuel pump and a spring-loaded type of injection valve are being used in this work. As a result of the tests it is thought that the pre-combustion chamber type of cylinder head is the more promising of the two for application to aero engines. A good deal of research work has also been carried out at this laboratory on fuel injection pumps and valves, on characteristics of fuel sprays, and on fuel characteristics. Super-charging is a subject which has for a good many years received attention in America, and the following reference to tests from the report of the Power Plants Sub-Committee is of interest. Comparative climb performance tests with and without supercharging of a D.T.2 seaplane, carrying equivalent military loads up to 2,000 lbs., have been completed, the supercharger fitted being of the Roots type. The results have shown that a material improvement in the performance of this type of aeroplane could be obtained by supercharging, even when heavily loaded and operating to moderate altitudes. It was found that when maintaining practical sea-level pressure at the carburettor at all times when supercharging the absolute ceiling was increased 90 per cent. when operating without military load, and 50 per cent. when operating with load. The service ceiling was increased about 80 per cent. for all loads, while the average rate of climb to the service ceiling was the same. The climb when supercharging was inferior at low altitudes, owing to the use of large propellers.

What is claimed to be the first successful supercharging of an air-cooled engine at high altitude has been accomplished at the Langley Memorial Laboratory, using the Roots type supercharger. Further tests with the Lawrance (Wright) J-1 engine with Roots supercharger in a T.S. land 'plane have been completed. When using the same propeller and maintaining full supercharging to 16,000 ft., the original service ceiling of 16,100 ft. was increased 65 per cent. The absolute ceiling was increased 56 per cent., the time to 16,100 ft. was reduced 59 per cent., and the average rate of climb to the new service ceiling was 43 per cent. greater than to the original ceiling without supercharging. Additional information of the effect of supercharging on the cylinder head temperatures of each of the nine cylinders has been obtained, giving maximum recorded temperatures for the various cylinders ranging between 500° F. and 560° F. Close examination of the engine revealed no undue wear or other ill-effects as a result of supercharging.

Other experiments with a Roots type supercharger on an engine having somewhat different cylinder construction have also shown a considerable increase in performance, apparently obtained with no detriment to the engine and without encountering excessive cylinder head temperatures.

A study has been continued of the relative performance of the normal compression engine, the high compression engine, and the supercharged normal compression engine. The results have shown that the maximum power output of the high compression engine operating on domestic aviation petrol at sea-level is obtained by maintaining full throttle and retarding the ignition timing sufficiently to suppress detonation, although the fuel consumption with this method is high.

The results of these tests will be used in connection with a programme of flight tests which is being conducted to determine the relative performance of a service type seaplane of the load carrying type, equipped with a normal compression engine, a high compression engine, and a supercharged normal compression engine, all having the same displacement and being used both with direct and geared propeller drives.

At the Bureau of Standards engine tests under approximate altitude conditions have been carried out by reducing the pressure at the entrance to the carburettor and at the exhaust port, exactly as in an altitude laboratory test, but allowing the air surrounding the engine to remain at sea-level pressure. Similar tests were made under "true" altitude conditions, *i.e.*, with the air surrounding the engine reduced to a pressure corresponding to the altitude. It was concluded that provided certain precautions were taken, satisfactory results could ordinarily be expected with the approximate type of tests.

New Engine Types

Both the Bureau of Aeronautics of the Navy Department and the Engineering Division of the Army Air Service have continued their efforts towards an increase in the reliability of aircraft engines, and the two organisations have co-operated closely in this development. A striking piece of work on the part of the Air Service is the new air-cooled Liberty. The report states that this engine has demonstrated on test that the air-cooled in-line engine will be one of the important developments of the future. A description of this engine was published in FLIGHT of January 21, 1926.

In this report is found the interesting statement that the Wright model P-2, the 400-h.p static radial air-cooled engine, which incorporates the fan type supercharger for rotary induction purposes, has passed its acceptance tests with very excellent performance. Twelve of these engines have been ordered for flight-testing purposes.

In view of the keen rivalry between air-cooled and water-cooled engines, the following paragraph from the report of the Power Plant Sub-Committee is of interest: "The rise of the air-cooled engine with important reduction in power plant weights, due to the elimination of the cooling system, has forced the water-cooled engine to new endeavours. Increased power has brought about a balance on the basis of specific power plant weights between the two engines. This will undoubtedly force the air-cooled engine into the higher speeds and reduction gearing. Since results indicate that a large percentage of power plant failures are due to faults in gasoline, oil and water lines, the air-cooled engine still has important advantages. This fact accounts for the energy which is now being put into development of the three air-cooled engines for the Navy." The reference in the last sentence is to three Wright engines, the J-4 A of 800 cub. in. capacity, which will be used as a training engine, the new R-1,200 cub. in. engine which will be used in the observation and fighter class, and the 1,600 cub. in. P-2 intended for

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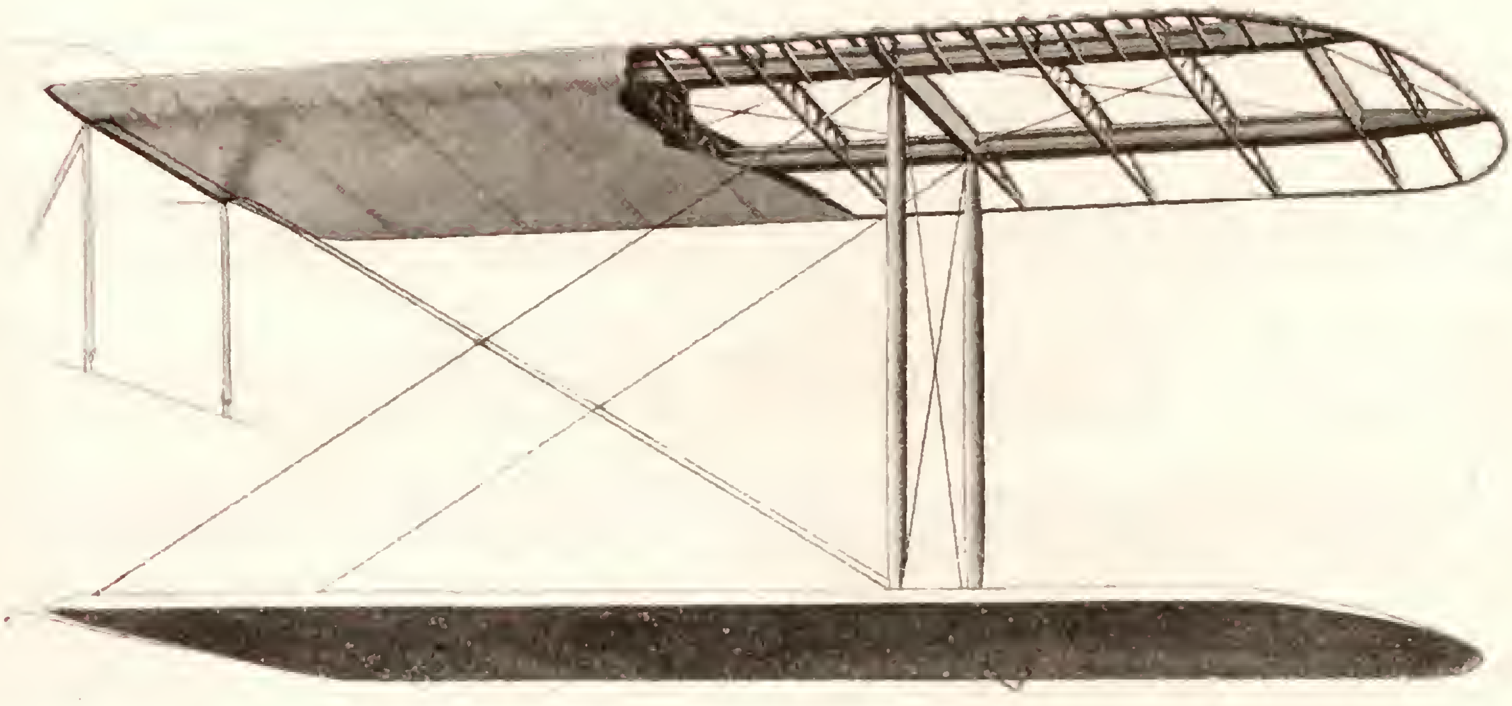
[*] Extracts from the Eleventh Annual Report of the American National Advisory Committee for Aeronautics.

This announcement is the fifth of a series dealing with

DESIGN & CONSTRUCTIONAL FEATURES OF DH AIRCRAFT.



WING CONSTRUCTION.

¶ The above diagram of the port main planes and bracing of the de Havilland "MOTH" shows the simplicity of the detail construction of the planes.

¶ Careful detail design combined with the use of materials of the highest quality is responsible for great strength of the cellule, enabling the "MOTH" to qualify for the Air Ministry Certificate of Airworthiness in the Aerobatic Class.

¶ Practical experiments on standard spars which have been tested to destruction have shown factors of nine under full load conditions.

¶ Although twin lift wires are not used, duplication is carried through the incidence bracing, that is to say, that, if either a front or rear main lift wire breaks in flight, its load is taken *via* the incidence wires to the remaining lift wire, which is amply robust to carry the additional load.

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Materials

The Sub-Committee on Aircraft Materials is further subdivided into three sub-committees, one dealing with metals, a second with woods and glues, and a third with coverings, dopes and protective coatings.

During 1925 the Sub-Committee on Metals recommended a programme of research for the study of intercrystalline embrittlement of Duralumin. The outline of this programme was as follows: (*a*) the study of acceleration of this type of corrosion for testing purposes; (*b*) the effect of permanent deformation on material hardened by spontaneous ageing; (*c*) the effect of deformation on fully hardened material hardened by accelerated ageing at a higher temperature; (*d*) the effect of protective coatings; (*e*) the effect of gas during casting; (*f*) the effect of heating and quenching mediums; (*g*) the effect of the composition of the Duralumin tested.

Intercrystalline attack and embrittlement in material received from two American companies was produced experimentally, both in aged material and in material cold-rolled after ageing. Material which had been greatly deformed by rolling after ageing and slightly deformed by stretching, is stated to be under test. Preliminary results indicate that stretching prior to test hastens the intercrystalline corrosive attack.

The Bureau of Standards has continued to examine specimens found in service. These all confirm the conclusion that material cold-worked after ageing and subjected to corrosion is especially susceptible to embrittlement, although if the conditions are severe material which has not been worked after ageing is also attacked. Material which had been attacked in service by calcium chloride, cleaned, and re-varnished, was recently examined to see whether the intercrystalline attack had progressed. No proof was found that the attack had progressed further since the previous examination. These results indicate that a coating which is actually impervious to such agents as water vapour and " salt air " prevents the corrosion. The material was in " notch brittle " condition after cleaning, and was still in that condition, although apparently no worse. The report states that the information now in the possession of the Committee does not justify a pessimistic outlook in respect to the use of Duralumin as a structural material for aircraft, unless in very thin sheets. It is believed that research on the embrittlement problem will ultimately show how to prepare, protect and use this material to ensure reliability in service.

Concerning airship structures, the report states that previous tests of girders for the " Shenandoah " showed that the strength of these girders was determined by the elastic properties of the channels and the type of restraint offered by the lattices. The principal elastic constants of the channel are their two flexural stiffnesses (moments of inertia Young's modulus) and their torsional stiffness (torsion constant shear modulus). The object of the modern investigation was to determine by tests the relative importance of these three constants in determining the strength of the girders. According to the report the measurements so far made are consistent with the assumption that with the present construction the coefficient of torsional stiffness of the channels is the controlling factor in determining the load which these girders will carry.

The report points out that the Forest Products Laboratory of the Department of Agriculture conducts practically all the investigations on the application of woods and glues to aircraft construction. A lengthy series of tests is reported by the Sub-Committee on Woods and Glues, to which we are unable to refer in detail, owing to lack of space. A brief list of the subjects dealt with may, however, serve to give an indication of the class of work that has been undertaken. A study of the effects of the attachment of metal parts and fittings to wood members was undertaken and the results of the tests have been presented in the form of charts which give the most efficient size of bolt for given conditions.

A series of tests has been made on box spars of various dimensions and on I-section spars having plywood webs. The results lead to the conclusion that in the design either of plywood box or I-section spars a web thickness 25 per cent. greater than that calculated to give equal likelihood of failure by shear or compression will give the best results.

A preliminary study was made on the use of screws for fastening three-ply wood to spruce and ash frame members. As a result of the tests a table of screw sizes for different thicknesses of three-ply wood has been prepared for general design use.

Concerning waterproof glues, the report states that no adequate study has been made of the durability of glued joints under long periods of time. Experience indicates that in many places where glued joints are used, any change in strength or water resistance is very slow. Tests will be carried on over a long period of time with different water-resisting glues to determine the conditions under which glues will retain their original properties.

An investigation has been carried out in an effort to produce a grade A plywood with casein glues. The report states that satisfactory results have been secured on a laboratory scale and that plans are now being developed for one or more demonstrations on a factory scale. It is believed that by proper control of the glue and the glueing conditions it will be practicable to produce a satisfactory product in quantity.

Investigations have also been carried out on air seasoning of aircraft woods, on the effect of fungus infection on the mechanical properties of wood, and on the cause and detection of brashness of wood.

The Sub-Committee on Coverings, Dopes and Protective Coatings reports that at the Bureau of Standards extensive investigations have been conducted in the developments of experimental gas-cell fabrics for rigid airships. It is believed that a certain type of fabric which has been developed will, when fully developed, be the most satisfactory substitute for the goldbeater's skin now used in rigid airships.

A coating for Duralumin produced by anodic deposit of the metal in a plating bath has been developed. The deposit is stated to be a luminum oxide, which is said to be a distinct protection. The process is understood to be patented. Usually the articles are lacquered after the plated coating is applied.

At the suggestion of the Bureau of Aeronautics, Duralumin sheets such as are used for seaplane floats, were alternately exposed to sea-water and to air under tropical conditions. A coating has been developed which, it is stated, will prevent the growth of barnacles and be durable in air. It is made from plastic resin, coal tar, and toxic poisons. At the Naval Aircraft Factory, the report states, excellent results have been obtained, by using an inexpensive bituminous paint for floats and hulls, and it is stated that if the surfaces are enclosed this paint probably gives the best protection against under-water corrosion. The disadvantage is that the coating is heavy. The paint can be greatly improved by the addition of 10 to 20 per cent. of asbestine, a crystalline pigment showing a rod-like structure under the microscope.

On the subject of coatings for magnesium to prevent corrosion, preliminary exposure tests of magnesium sheets have been made and it was found that uncoated magnesium sheets corroded slightly and the colour became dark if exposed so that moisture dried off, but that they became deeply pitted in six months if the surface did not dry off. Sheets coated with silicate of soda resisted corrosion better than uncoated sheets, although if the surface did not dry off they did corrode. Two coats of aluminium spar varnish appeared to give perfect protection. Six months' tests showed about equal corrosion in magnesium and in steel sheets.

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Changes at Supermarine's

The London office of the Supermarine Aviation Works, Ltd., has been removed to Bush House, Aldwich, London, W.C. 2. The telephone number is now Central 7262, and the telegraphic address is " Supermarine, Estrand, London." We are also informed that Mr. H. Leigh Mossley, formerly on the board of directors, and London representative, has no longer any connection with the Supermarine Aviation Works, Ltd.

R.A.F. Flying Accidents

The Air Ministry regrets to announce that as a result of an accident at Calshot to a Fairey III.D., of the Royal Air Force Base, Calshot, on February 26, 1926, Flight-Lieut. Geoffrey William Hemming, the pilot of the aircraft, and Flying Officer Robert Collins were seriously injured. Flight-Lieut. Hemming died of his injuries shortly afterwards, and Flying Officer Collins died in hospital on February 28.

As a result of an accident at Karachi, India, to a Bristol Fighter of the Aircraft Depot, Karachi, on March 5, Flying Officer Camille Percy Maurice Benjamin Caillard, the pilot of the aircraft, was killed, and No. 111099 L.A.C. Andrew Barron, was seriously injured and died shortly afterwards.

IN PARLIAMENT

Qualified Pilots

Mr. A. Williams, on February 24, asked the number of qualified pilots in His Majesty's Air Force at the present time ?

Sir S. Hoare : The number of qualified pilots in the Regular Air Force is 2,306, of whom, however, 103 are, for medical or other reasons, no longer available for pilots' duties.

Brennan Helicopter

Mr. Rose asked the total amount expended upon the experiments in connection with the Brennan helicopter from the beginning until the abandonment of the design last year ; and whether the country is under any further obligation to the inventor ?

Sir S. Hoare : The total amount expended over the seven years during which the experiments have been proceeding at Farnborough is estimated at £55,000. As regards the second part of the question, Mr. Brennan's contract with the Air Ministry expires on March 31 next, and I am not aware that he has any contractual relations with other Departments of State.

Mr. Rose : Why has this design been persisted in and all this money wasted ?

Sir S. Hoare : The money has not been wasted. We learnt very valuable lessons from the experience gained.

Mr. Rose : Does the right hon. gentleman consider that seven or eight years' work and an expenditure of £55,000 on a thing that is smashed as soon as it was started is valuable ? To whom is it valuable ?

Sir S. Hoare : The hon. Member can draw his own conclusions. In my view it has been of value to the Air Ministry and the State generally.

Passenger Air Services

Sir F. Hall asked how many passengers were carried in 1925 by civil air services operating to and from this country ; and what proportion of these were carried by British-controlled services ?

Sir S. Hoare : The answer to the first part of the question is 20,721 ; to the second 51 per cent.

German Airships

Mr. Wells asked the Secretary of State for Air if he can state, with regard to Germany, the number of airships in use last year, the number of airship flights, and the number of passengers carried ?

Sir S. Hoare : There were no airships in use in Germany last year.

Air Staff and Administrative Staff

Sir F. Sykes asked the Secretary of State for Air the number of officers on the Air staff and on the administrative staff at the Air Ministry, respectively, who are staff college graduates ; and in respect of such officers the numbers in each class who have served on the headquarters staff of a Dominion Government defence force ?

Sir S. Hoare : The answer to the first part of the question is 19 officers of the Air staff and 11 officers of the administrative staff of the Air Ministry ; to the second part, that one officer of the Air staff and one of the administrative staff have served on the headquarters staff of a Dominion Government defence force. These numbers include officers who have graduated or completed a course at the Army, Navy and Air Force Staff Colleges.

Imperial Defence and Three Co-equal Services

Mr. Ramsay Macdonald, on February 25, asked the Prime Minister whether he can inform the House before to-day's Debate whether the Government have any intention of raising afresh, by inquiry or otherwise, the question of the independent status of the Air Force and Air Ministry ?

The Prime Minister : I think it essential to announce that, in accordance with the policy of successive Administrations, the Government have no intention of re-opening the question of a separate Air arm and Air Ministry. We intend to pursue the organisation of Imperial Defence on the existing basis of three co-equal Services. It is in the interests of the Fighting Services that controversy upon this subject should now cease. We are convinced that the way to secure the higher co-ordination in our Defence machinery, indispensable to full efficiency and, indeed, to economy, lies not in the abolition of any one of the three established arms of His Majesty's Forces, but in combined action between all three through the machinery of the Committee of Imperial Defence and the agency of the recently instituted Committee of Chiefs of Staff. We are sure that we can rely upon all concerned to devote themselves loyally and wholeheartedly to this end.

Lieut-Commander Kenworthy : Will the right hon. Gentleman inquire into the feasibility of a Ministry of Defence for the co-ordination of the three Services on better lines in view of the economies that would result ?

The Prime Minister : That raises an entirely different question.

Lieut.-Commander Kenworthy : Oh, no.

Mr. Basil Peto : Will the Prime Minister bear in mind that he recently asked Members of this House to make suggestions for economy, and therefore, on the ground of economy alone, is it not desirable that the question referred to in his answer should at least be debated, and that members should not be understood to be muzzled and not to raise questions of this sort because it has been announced that it is not the policy of His Majesty's Government ?

The Prime Minister : The thought of muzzling never entered my head. A statement on somewhat similar lines has been made by each successive Government. I think it is the appropriate time, when these Estimates come before the House, to make such a statement.

Personnel and Machines (Ratio).

Maj. Glyn asked the Secretary of State for Air how many men does it require to-day to keep one aeroplane in service on the same method of calculation by which it was recorded that the figures for 1918 were 81, and for 1924, 53 ?

Sir S. Hoare : On the assumption that the figures quoted and requested relate to the ratio between the personnel strength of the Royal Air Force and the number of machines on the first-line establishments of Service squadrons, the ratio at present may be stated as between 49 and 50 personnel of all ranks for each first-line aeroplane in Service squadrons.

Royal Aircraft Factory, Farnborough.

Mr. Kelly, on February 26, asked the number of employees engaged at the Royal Aircraft Factory at Farnborough in January, 1924, January, 1925, and January, 1926, respectively.

Sir S. Hoare : The figures are as follow for the experimental and research and industrial staff :—January 1, 1924, 979 ; 1925, 1,002 ; 1926, 1,064. The technical staff located at Farnborough for airworthiness investigations, etc., are not included in these figures ; nor are the drawing-office staffs, clerks, typists, etc., who perform common services for the whole staff. The increase is due to greater concentration on scientific research and additional requirements in connection with the expansion of the Royal Air Force for home defence.

Flight Programme in Africa

Sir H. Brittain, on March 3, asked the Secretary of State for Air what is the approximate time within which the flight now being carried out by the Royal Air Force in Africa is to be completed ; and what will be the mileage flown ?

Sir S. Hoare : As regards the first part of the question, it is expected that the programme of the flight, which includes visits of varying duration to Pretoria and other centres as well as to Cape Town, will be completed within three months. The answer to the last part of the question is approximately 10,000 miles.

Air Forces Comparative Strengths and Expenditure

Sir Charles Cayzer asked the Secretary of State for Air (1) the present strength in fully-trained air pilots and first-line aeroplanes of the following Powers :—France, Italy, and the United States ; whether he has any information showing the extent to which the above-mentioned Powers intend to increase these air forces in pilots and first-line machines in the near future ; and whether he has any information as to the cost of the proposed increases ;

(2) The amounts spent on their respective Air Forces for the financial year 1925-26, or during the last account period available, translated for purposes of comparison into pounds sterling at present rates of exchange, of the following Powers :—Great Britain, France, Italy, and the United States ; and whether he can state the number of first-line aeroplanes available in a sudden emergency at present maintained by the above-mentioned Powers ?

Sir S. Hoare : As regards the first-line aircraft of France and Italy, I would refer my hon. Friend to the reply to the hon. Member for Finsbury, on February 10 ; according to the latest information available the first-line strength of the United States is about 600 machines. Whilst these countries have not, so far as I am aware, recently published any exact statistics of their flying personnel, the report of the Morrow (American) Aircraft Board gives the number of Italian pilots as 921, whilst the corresponding French figure is shown as 3,184. The same report gives the number of United States pilots as 1,473. I understand that the French Naval Air Service is eventually to be increased to 50 squadrons, and the Italian Air Service to 182 squadrons, but I have no information as to the cost involved nor of any contemplated increases in the French Military Air Service or in the United States Air Services.

As regards the amounts spent in 1925-26, as stated in my reply to Mr. Groves on July 29 last, it is not possible to segregate the expenditure of France and the United States upon their air services from their general naval and military expenditure on a basis comparable with British air expenditure—and adequate information is not available in regard to the cost of the Italian air service. In this connection I may say that the Morrow Report above referred to expressly recognises the impossibility of comparing the so-called air expenditure of the various Powers.

As regards the air expenditure of Great Britain, I would refer my hon. Friend to Air Estimates. A deduction of approximately £1,250,000 should, however, be made from the figures there given in respect of civil aviation, meteorology, supplies to British and Indian Army personnel in the Middle East, and other services which cannot properly be included in the cost of the Royal Air Force.

Further, Air Estimates include, in addition to maintenance charges, a large element of capital expenditure in connection with the expansion of the Royal Air Force for Home Defence.

Civil Aviation Accidents

Brigadier-General Brooke asked the Secretary of State for Air the number of accidents during 1924 and 1925 in which civilians carried by civil air services operating to and from this country were involved, and the number of fatalities ?.

Sir S. Hoare : As regards British civil air lines, there were in 1924 one fatal accident involving eight deaths and three accidents without casualties ; there were no accidents in 1925. As regards accidents on foreign air lines in this country, there were two accidents without casualties in 1924, and one fatal accident involving one death and injuries to two passengers and two accidents without casualties in 1925.

Cost of R.A.F. Forces in Iraq

Mr. Short asked the total cost of the maintenance of the Air Force in Iraq during 1919, 1920, 1921, 1922, 1923, 1924, and 1925, respectively ?

Sir S. Hoare : The following table gives the information requested by the hon Member :—

	£
1919-1920 (approximate)	835,000
1920-1921 (approximate)	1,060,000
1921-1922	1,346,158
1922-1923	2,799,367
1923-1924	3,575,984
1924-1925	3,188,675
1925-1926 (estimate)	2,744,100

These figures include for part of 1922-1923, and for subsequent years provision for various ancillary services undertaken by the Royal Air Force on behalf of the British and Indian Army personnel in Iraq, the expense of which had previously been borne on Army Votes.

British Air Mails

Commander Bellairs, on March 8, asked the Secretary of State for Air the number of miles flown by British airplanes carrying mails last year, compared to 2,501,555 miles flown by the American Post Office Air Mail Service in the fiscal year 1924-25 ?

Sir Samuel Hoare : There is no organisation parallel to the American Post Office Air Mail Service in this country, where commercial aviation is left to private enterprise ; the Cairo-Bagdad air mail service operated by the Royal Air Force is maintained primarily for military purposes. I am, therefore, unable to give any comparable figures.

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A Correction

In the last issue of The Aircraft Engineer two typographical errors occurred. On page 110*a* the last words of the first paragraph should have been " gun fire" and *not* "gun power " as printed. On p. 110*c*, column 2, the last word of the first line should have been " mechanistic ", and *not* " metaphysic."

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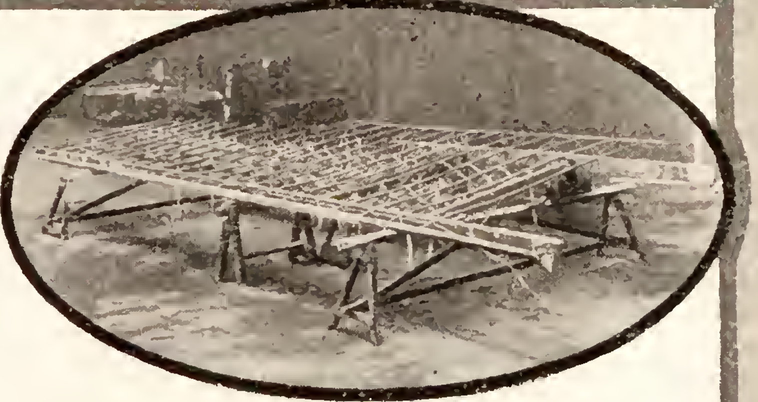

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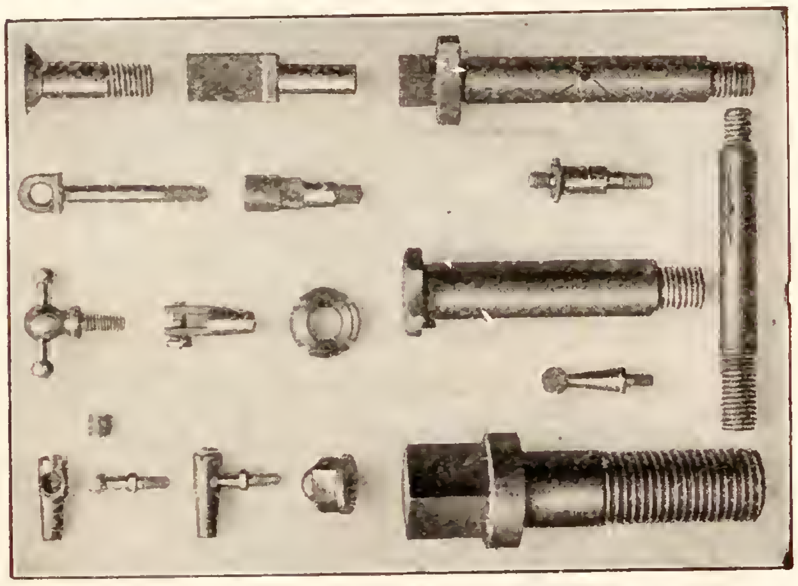

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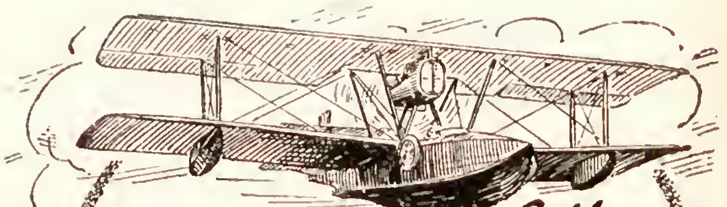

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THE ROYAL AIR FORCE

London Gazette, March 2, 1926

General Duties Branch

Flight-Lieut. C. G. Wigglesworth, A.F.C., is granted a perm. commn. in this rank; Jan. 1. The following airmen are granted perm. commns. as Pilot Officers on probation, with effect from and with seny. of March 1: 10577 Sgt. J. McGuinness, 90741 Sgt. G. E. Campbell, D.F.M., 220549 Sgt. A. H. Owen. The following Pilot Officers are promoted to rank of Flying Officer: A. W. Elias, J. E. W. Bowles, H. R. D. Waghorn, F. M. Denny; Jan. 31. R. F. Francis; Feb. 15. Wing-Comdr. T. G. Hetherington, C.B.E., is restored to full pay from half-pay; Feb. 17. Wing-Comdr. J. C. Halahan, C.B.E., A.F.C., is placed on retired list and granted permission to retain rank of Group Capt.; Feb. 28. Sqdn.-Ldr. R. A. de H. Haig, A.F.C., is placed on retired list at his own request; March 3. Flying Officer H. L. Christie is transferred to Reserve, Class A; March 1.

Stores Branch

Flying Officer R. D. Lambert is placed on retired list on account of ill-health; March 3.

Accountant Branch

Flying Officer F. C. Warner (Capt., R.A.R.O., Leicestershire Regt.) is dismissed the service by sentence of Field General Court-martial; Dec. 30, 1925.

Memorandum

Flight-Lieut. E. L. Johnston, A.F.C., is granted permission to retain rank of Squadron-Leader.

Reserve of Air Force Officers

E. C. Hoar is granted commn. in Class A, General Duties Branch, as Flying Officer on probation; March 2. The following Pilot Officers are promoted to rank of Flying Officer; C. H. E. Coles; Dec. 16, 1925. L. F. Cubitt; Dec. 23, 1925. W. R. W. Kelley; Dec. 27, 1925. A. A. C. N. Smith; Dec. 31, 1925. H. A. Record; Jan. 21. L. H. A. Fray; Jan. 24; R. D. Wayman; Jan. 26.

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified:—

General Duties Branch

Group Captain W. F. MacNeece, C.B.E., D.S.O., D.F.C., to R.A.F. Depot, Supernumerary, whilst employed with League of Nations Disarmament Committee; 1.3.26.

Wing Commander I. G. V. Fowler, A.F.C., to Inland Area Aircraft Depot, Henlow, for Techn. duties; 8.3.26.

Flight Lieutenants: F. H. Laurence, M.C., to H.Q., India; 26.1.26. A. S. G. Lee, M.C., to H.Q., Iraq; 16.2.26. C. Turner, A.F.C., to H.Q., Egypt; 14.2.26

Flying Officers: P. D. Baker, to No. 2 Flying Training Sch., Digby; 23.3.26. F. R. D. Swain, to No. 2 Flying Training Sch., Digby; 1.3.26. A. W. Daly, to No. 11 Sqdn., Netheravon; 23.2.26. J. S. Phillips, to H.Q., Egypt; 15.2.26. J. T. Hall, to No. 9 Sqdn., Manston; 8.3.26.

Pilot Officers: J. McGuinness, to R.A.F. Depot, on appointment to a Permanent Commn. (on probation); 1.3.26. G. E. Campbell, D.F.M., to No. 39 Sqdn., Spittlegate, on appointment to a Permanent Commn. (on probation); 1.3.26. A. H. Owen, to No. 207 Sqdn., Eastchurch, on appointment to a Permanent Commn. (on probation); 1.3.26.

Stores Branch

Squadron Leader W. L. Shaw, M.B.E., to Air Ministry; 8.3.26.

Flight-Lieutenants: A. Jukes, M.B.E., to Air Ministry; 1.3.26. E. W. Crosbie, to No. 1 Group H.Q., Kidbrooke; 1.3.26. K. D. G. Collier, to R.A.F. Base, Gosport; 24.2.26. H. E. T. Crocker, to Armament and Gunnery Sch., Eastchurch; 25.2.26. H. J. Barnham, to Station H.Q., Spittlegate; 22.2.26.

Flight Lieutenants: J. C. Shakeshaft, to No. 10 Group, H.Q., Lee-on-Solent; 8.3.26. P. J. Murphy and P. F. Connaughton, to Supply Services (Central Supply Depot), Iraq; 6.2.26.

Flying Officers: E. V. Bashford, to No. 502 Ulster Sqdn., Aldergrove; 23.2.26. R. D. Lambert, to No. 43 Sqdn., Henlow; 9.2.26. E. V. E. Andrewartha, to C. & M. Party, Cattewater; 19.2.26.

Flying Officer J. McCarthy, to H.Q., Egypt; 10.2.26.

Flying Officers: E. S. Bullen, M.B.E., to R.A.F. Base, Calshot; 8.3.26. E. F. Elliott, to Supply Services (Base Supply Depot), Iraq; 6.2.26. G. W. Longstaff, to Supply Services (Central Supply Depot), Iraq; 6.2.26.

Medical Branch

Flight-Lieutenant (Hon. Sqdn.-Ldr.) F. W. Squair, M.B., T.D., to R.A.F. Depot; 8.3.26.

Flying Officers: E. J. Jenkins, to No. 7 Sqdn., Bircham Newton; 24.2.26. J. P. Hederman and E. J. Mockler, M.B., to Research Lab. and Med. Officers, School of Instruction, Hampstead, on appointment to Short Service Commns., for short course; 23.2.26. R. L. C. Fisher, M.B., to Inland Area Aircraft Depot, Henlow; 18.2.26.

NAVAL APPOINTMENTS

The following appointments have been made by the Admiralty:—

Lieuts. (*Flying Officers, R.A.F.*).—T. H. Villiers, to *Enterprise*, addl., and for flying duties in No. 406 Flight (on commg.); and R. A. Aldridge, to *Furious*, and for flying duties in No. 404 Flight (on *Enterprise* commg.). R. C. Allen, to *Eagle*, and for 402 Flight; Feb. 20.

CORRESPONDENCE

The Editor does not hold himself responsible for opinions expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters intended for insertion in these columns.

STALLED CONTROL

[2127] Mr. Courtney's article in the issue of February 25 on the subject of "Stalled Flight and Control" opens up a subject of great importance. Except for some minor points, I am in thorough agreement with Mr. Courtney's remarks, and it is difficult to see how anyone, who has had reasonable flying experience, can be otherwise.

To sum up briefly:—

(1) *All* aeroplanes are (or should be) capable of being easily "stalled" by the pilot.

(2) If controls are infinitely improved the machine will still stall and may be brought down on a more even keel, but the impact will still be a very serious matter.

By all means let us improve control as much as possible, but does it take us much further towards safety in or after a stall?

It only brings us nearer safety if the method of training the pupil is based on correct principles.

I fully endorse Mr. Courtney's remark in which he says: "Make the stall crash subject a definite and important part of flying instruction." This is what I have been advocating for some years, because I believe it would have the effect of largely reducing the number of serious crashes.

As regards military training of pilots, there may be some sound reason why the present method is used, but of this I have no knowledge.

If we agree that prevention is better than cure, then in teaching the ordinary man to fly the correct method would seem to be:—

(1) To instil into the pupil by every possible means the importance of loss of speed.

(2) To make full use of the air speed indicator in training, from the very beginning.

At present we have an interesting paradox: on the one hand people are striving after "*control beyond stalling*" (chiefly aileron), and on the other hand, the orthodox method of training tells a pupil to assume the near approach of stalling "*by the loss of aileron control.*"

There are many machines existing today that have some degree of lateral control when on the point of stalling, so that when a pupil changes to a new type of machine it is only good luck if he does not stall. He has been taught to judge stalling by the feel of the lateral control, which feel only applies to the particular machine he has learnt on, and, in any case, only gives him warning when it is probably too late. He must not look at the air speed indicator, which does give him the information he requires, but why not?

There is, undoubtedly, prejudice among some pilots against the use of the air speed indicator, but I have never heard any sound argument in support of this attitude.

It is difficult to get away from a firmly-rooted idea, although it may be a fundamentally wrong idea, and I believe this applies to the use of the air speed indicator in training and general flying.

The method of instruction at some civilian schools is moving in the direction of the principles advocated. The London Aeroplane Club is an example, and it is to be congratulated on complete freedom from "stall" crashes and, in fact, from any serious accident.

Mr. Courtney has done well to open this subject, and I hope there will be further contributions to the columns of THE AIRCRAFT ENGINEER.

Stag Lane Aerodrome. G. DE HAVILLAND
March 5, 1926.

[2128] I have read Mr. Reynolds's reply to my article on "Stalled Control," which letter, I might point out to start with, comes from the Slotted Wing Factory. The last three words of his letter are in Latin, but the rest is Greek.

I certainly flew the slotted-aileron Avro for long enough to satisfy myself that the control did not work as intended. This, however, has nothing to do with my main contention that it would be of no use if it did.

For the rest, Mr. Reynolds begs the whole question and loses the whole point.

He mistakes my appreciation of the ordinary large rudder as a demand for an *enormous* rudder.

He says that the reduction in drag on the down aileron makes that aileron go forward, without appearing to realise that a reduction in a positive does not necessarily make a negative, and certainly not in this case.

Where on earth he gets his idea that a stalled machine can keep on an even keel and pancake at a mere 16 to 20 ft. per second I do not know. If he can design such a machine it would be a godsend. So why doesn't he? This remark alone is sufficient to suggest that he has no appreciation of the subject under discussion.

His remarks on loss of height appear mysteriously to apply to anything except his own device.

There is nothing in Mr. Reynolds's letter to alter my opinion from what I originally said—namely, that the slotted aileron control does not do what it professes to do, and that if it did it would be of no use. Capt. Thomson's letter, while apparently only distantly referring to the subject, really touches the basis of the whole matter, in that he infers that the subject of the stalled crash is a vastly deeper matter than the mere fiddling with a stalling lateral control.

I would point out to Mr. Reynolds that this is almost entirely a flying matter. Before Mr. Reynolds gibes further at the "technique" of flying he should, perhaps, learn that the "joy-stick" can be used just as scientifically and just as unscientifically as the "guessing-stick."

In the meantime, we ignorant pilots await with interest Mr. Reynolds's machine which will pancake on a level keel at 16 to 20 ft. per second.

FRANK T. COURTNEY.

Wallington, Surrey.
March 5, 1926.

* * * *

Aircraft-Carrier Armament

IT was announced in the *Times* of March 6 that H.M.S. *Hermes*, Capt. C. P. Talbot, D.S.O., is due to arrive at Malta from the China station on March 13, to resume duties with the Mediterranean Fleet. As the First Lord stated in his Memorandum, the situation in Canton last July rendered it necessary to dispatch this vessel there from Malta as an additional protection for British lives and property. According to the new Return of Fleets, the anti-aircraft armament of the *Hermes* has been reduced from four to three 4-in. guns. The *Argus* has four such weapons, the *Eagle* five, and the *Furious* six. Of the aircraft carriers building, the French *Bearn* will have an anti-aircraft armament of six 3·9-in. guns, the Japanese *Akagi* of 12 4·7-in., and the American *Lexington* and *Saratoga* of 12 5-in. There is, therefore, considerable variation in current practice in this important feature of design.

Squad.-Ldr. Haig's Appointment

THE well-known firm of William Beardmore and Co., Ltd. have appointed Squad.-Ldr. de Haga Haig as "outside" manager in connection with their aviation and aero engine departments. This post, which is an indication of the firm's growing aeronautical activities, is similar to that of the outside manager for shipyard and engineering departments; *i.e.*, Squad.-Ldr. Haig will be responsible for tests, equipment and delivery of aircraft and aero engines, and will act as liaison official between the company and its clients in connection with the completion and delivery of each contract. Important work is now going through the shops both in the aero engine and aircraft departments. The latter, at Dalmuir, are engaged upon Beardmore-Rohrbach all-metal flying boats for the Air Ministry.

Air Traffic to Kamtschatka

THE systematic way in which the Russian Government is organising air traffic in Siberia and the Far East is again shown by the recent contracts, which have been made between Dobroljot and Gostorg (the State Trading Company), in accordance with which air traffic is to be opened between Krasnojarsk-Turuchansk and Budinka. The route is to be flown with Russian-built Junkers type all-metal aircraft and will serve mainly for the transport of furs. The arrangement is due to come into force by May, 1926. It is added that these air routes are of an experimental and preparatory nature with a view to organising a regular air transport to Kamtschatka.

IRISH AIRCRAFT FAIL TO LOCATE MISSING SEAMEN

RECENTLY we made brief reference to the employment of Irish Free State aircraft in searching for the missing crew of the ill-fated trawler, ss. *Cardigan Castle*, which was wrecked off the west coast of Ireland. We are now able to give some further information which may be of interest.

The aeroplanes—without, unfortunately, any successful result—used by the scouting party were three of the latest design of Bristol Fighters and one De Havilland. The machines left Baldonnel aerodrome for the west on February 20, and a safe landing was effected a few miles outside Clifden, Co. Galway, and close to the spot where Alcock and Brown alighted on completing their flight from Newfoundland.

Capt. Crossley piloted the D.H.9 round Clifden Bay and High Island, and ascertained that there were quite a number of places on the lee shore where a boat could land. They circled down on the island—which is a kind of Atlantic breakwater practically wholly composed of high cliff rock—as close as Capt. Crossley and his observer dared, but they saw no sign of life on the island. It was on a similar island that the crew of the *Tenby Castle*, which was also dashed against the rocks and wrecked, were found previously. The weather was very misty and visibility bad, but the aviators, when night was falling, dropped a quantity of food and some first-aid dressings on the island, thus ensuring that if any survivors of the wreck should happen to be on the island they would have sufficient food at least to last them for a week.

The machines engaged in the work of rescue visited in all a score of islands, but without result. High Island is the island from which the message, written on a piece of board, from four of the survivors was supposed to have been sent out.

The search by aeroplanes was instructed by President Cosgrave. When volunteer pilots and observers were called for this hazardous job, every officer present eagerly stepped forward. Although this aerial search failed to bring forth any result, the action taken by the Irish Free State in their effort to trace the English seamen is nevertheless thoroughly appreciated in this country.

* * * *

PUBLICATIONS RECEIVED

Aeronautical Committee Research, Reports and Memoranda: No. 983 (*Ae.* 195).—A Comparison of Model and Full-Scale Performance of the Bristol Fighter, using Flight-Lieut. Capon's Method of Presentation. By E. F. Relf. September, 1925. H.M. Stationery Office, Kingsway, London, W.C. 2. Price 4*d*. net.

* * * *

AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations: Cyl. = cylinder; i.c. = internal combustion: m. = motor.
The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

APPLIED FOR IN 1924

Published March 11, 1926

26,930. M. ADAMTCHIK and G. MASSERA. Snow-landing gear for aeroplanes. (247,283.)

27,786. D. J. MOONEY. Construction of aircraft members. (247,313.)

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11,545. ROHRBACH METALL-FLUGZEUG-BAU GES. Seaplanes. (241,514.)

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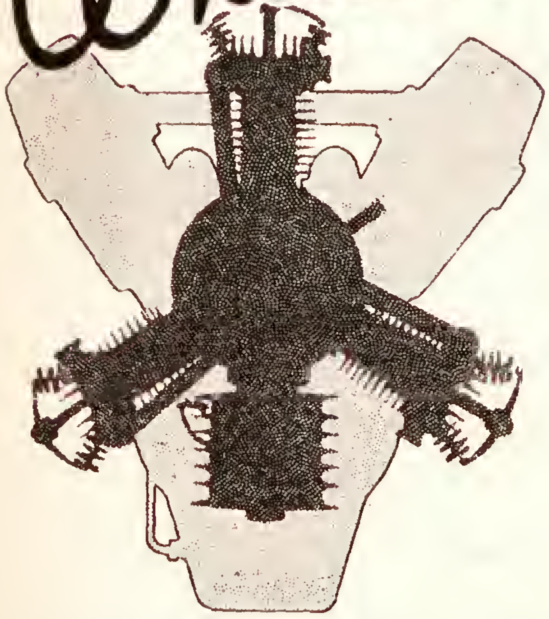

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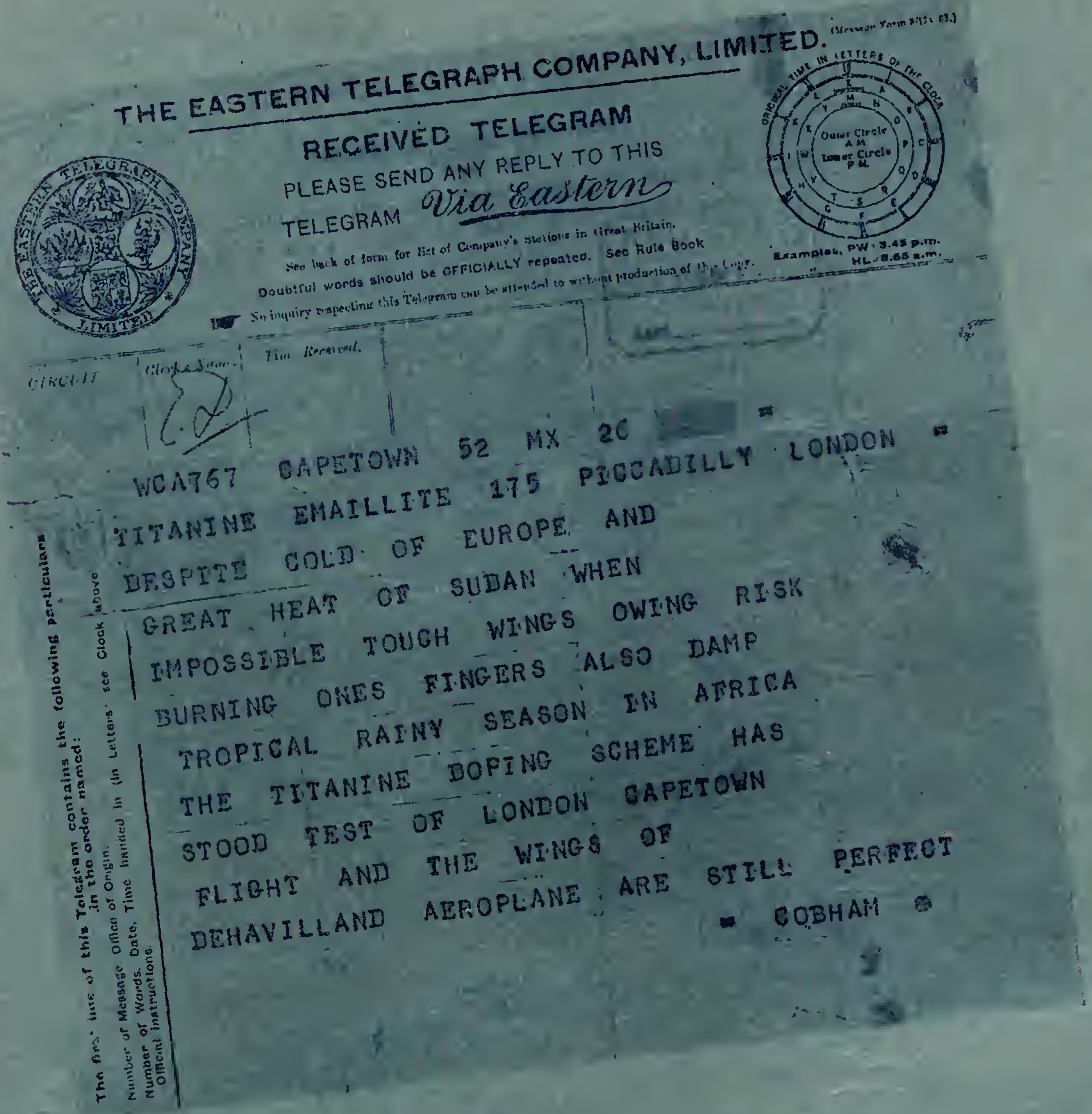

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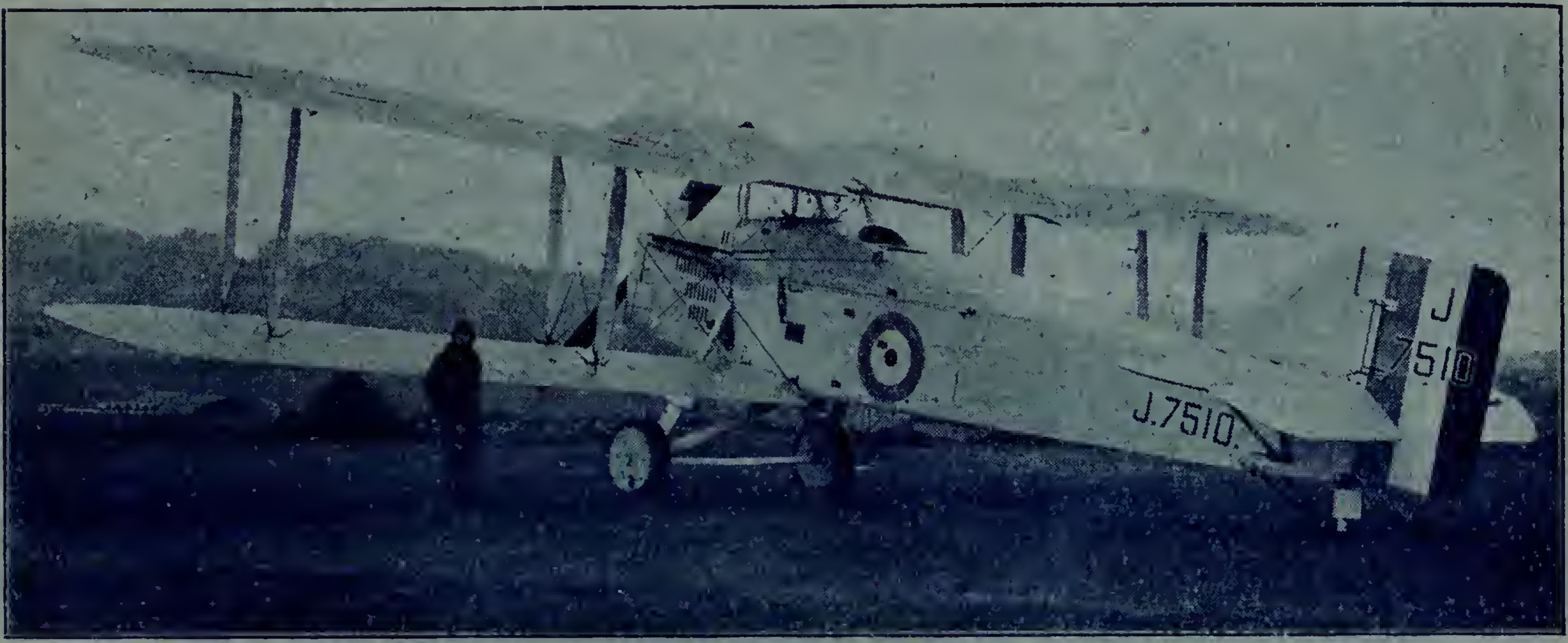

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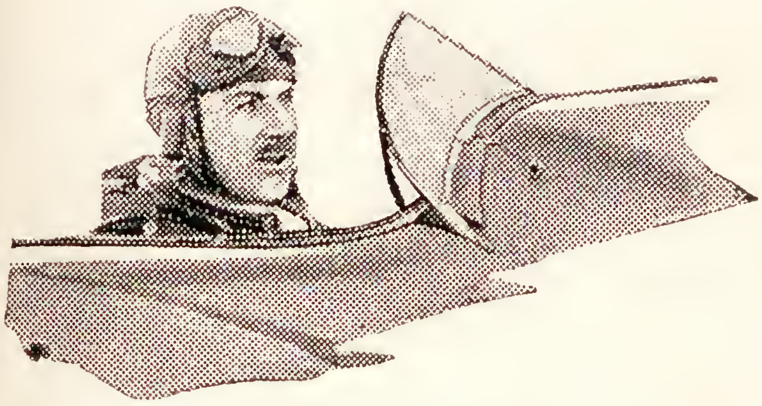

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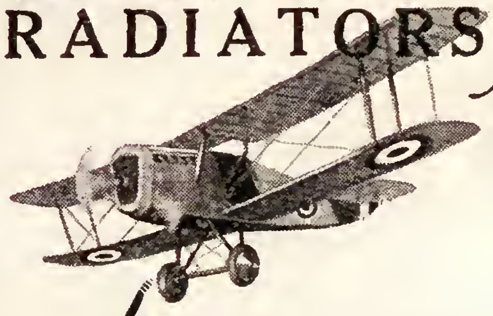

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CONTENTS

Editorial Comment PAGE
London–Cape–London ... 153
The Technical Aspect ... 154
Another Radial Triumph... ... 154
London–Cape–London 155
Bristol "Jupiter" Endurance Test ... 163
Vickers "Vendace" ... 165
Air Estimates Debate ... 168
Light 'Plane Club Doings ... 169
The Airship Club ... 169
Correspondence ... 170
Royal Air Force ... 171
R.A.F. Intelligence ... 171
Miss Douglas-Pennant ... 171
Imports and Exports ... 172

DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:—

1926	
Mar. 18	**Mr. A. J. Cobham. "Long-Distance Aeroplane Flights," before R.Ae.S.**
Mar. 22	**Entries close for Gordon Bennett Race.**
Mar. 25	**R.Ae.S. Annual General Meeting.**
Mar. 27	**R.A.F. *v.* Army, Rugby Match, Twickenham.**
Mar. 27	**R.A.F. (India) Reunion Dinner.**
Mar. 31	**Entries close for Schneider Cup Race.**
Mar. 31	**Royal Aero Club Annual General Meeting.**
April 8	**Marchese de Pinedo, "A 35,000 Miles Flight," before R.Ae.S.**
April 13	**Mr. S. H. Evans, A.F.R.Ae.S., M.I.Ae.E. "The Performance of Modern Aircraft—with special reference to the Variable Wing," before Inst.Ae.E.**
April 21	**Inst.Ae.E. visit to Messrs. D. Napier and Son, Acton.**
April 22	**Capt. G. T. R. Hill. "The Tailless Aeroplane," before R.Ae.S.**
April 29	**Lieut.-Col. V. C. Richmond. "Results of Recent Airship Flight Tests," before R.Ae.S.**
May	**Gordon-Bennett Balloon Race.**

INDEX FOR VOL. XVII

The Index for Vol. xvii of "Flight" (January to December, 1925) is now ready, and can be obtained from the Publishers, 36, Great Queen Street, Kingsway, W.C.2. Price 1s. per copy (1s. 1d. post free)

EDITORIAL COMMENT.

London-Cape-London

YET another great flight has been successfully accomplished by the return, on Saturday last, to Croydon, of Mr. Alan J. Cobham, Mr. Elliott and Mr. Emmott, on the completion of their flight of nearly 17,000 miles from London to Cape Town and back. Once more the aeroplane has been used successfully to "show the flag," and this time the flight has the further merit, as far as this country is concerned, that it was an all-British one. Aviators of other countries have made magnificent flights, and we yield to no one in our admiration of their achievements, yet there is great satisfaction in being able to point to such a splendid effort as that of Cobham's and say that it was entirely British. There are not lacking those who hold that this country has lost its leading position in air matters, and has left to others the task of "blazing the trail." Whatever may be the position in matters relating to air defence, there is not the slightest doubt that as regards individual efforts Great Britain can more than hold her own. Of this fact Cobham's great flight is a convincing demonstration. For this reason he, and all associated with him in the great venture deserve the thanks of the British public in general and the British aircraft world in particular. Apart from demonstrating the qualities of British aircraft and British aero engines, the flight to Cape Town and back must have done a tremendous amount of good in bringing home to the outlying posts of the Empire the potentialities of aviation. If commercial aviation is ever to amount to anything—and few will deny its vast possibilities—it must, as far as the British Empire is concerned, be based upon close co-operation between the mother country and the dominions, and consequently, anything which will assist to hasten the full appreciation of what aviation has to offer cannot fail to work towards a closer collaboration. It would be difficult to imagine anything more likely to attain that end than the splendid flight which has just been brought to a successful conclusion. During his flight Cobham has visited all manner of remote outposts of Empire, many of them with but the faintest knowledge of flying, and he has thus given thousands who had not previously seen a modern British aeroplane a much needed and much appreciated opportunity to inspect at close quarters a specimen of one of the latest examples of the vehicle of the future.

As regards the effect of the flight on other nations, this cannot fail to have been of inestimable value in raising British prestige abroad, and, in view of the statement of the Air Minister that aircraft manufacturers should, during the next year, make an effort to secure more orders from abroad so as to make up in some measure for the reduction in home orders which, unfortunately, the Air Estimates contemplate, Cobham's flight should be of very direct benefit, not only to the firms immediately concerned in the flight, but to the British aircraft industry in general.

◆ ◆ ◆

The Technical Aspect

As regards technical lessons of the London-Cape Town-London flight, there are several. For instance, Cobham has stated that large sections of the route over which he flew are admirably suited to be operated commercially—some of them appearing to be more especially seaplane routes. This applies particularly over the northern section of Africa. In South Africa, on the other hand, long distances are found over which the landplane could fly with perfect safety, the country being flat and abounding in landing grounds. In this connection we cannot refrain from referring to a subject that has been widely discussed in aviation circles, and which has also recently been brought up in the House of Commons. We refer to the decision of the South African Government to subsidise a German aircraft firm for the operation of air services. The experimental air mail service proved perfectly feasible, from a technical point of view. That it did not pay could have been foreseen. That the South African Government should, after abandoning the experimental service, have turned to a foreign nation for the equipment of an air route can only be described as regrettable, and it is to be hoped that among the many other benefits which Cobham's flight may be expected to give, it will have shown South Africa that there is no need to go abroad for flying equipment. From that point of view it would appear that Cobham's visit was a most timely one, and it will be interesting to see what effect it has when the next agreement with the S. A. Government comes to be considered.

Concerning the machine used, the de Havilland 50J, it is of interest to note that this is of the form of construction often described as composite, *i.e.*, with wooden main structure members and sheet steel fittings. We had no opportunity of inspecting the machine thoroughly at Croydon last Saturday, but a hurried examination failed to disclose any trouble or defect in the machine after its 17,000 miles' flight, so that the doubts often expressed as to how a wooden aeroplane will stand up to work in tropical climates appears to have been answered. The ply-wood-covered fuselage appeared to be in perfect condition; the fabric-covered wings showed no undue slackness, and the machine, although oily and dirty with the sand and ravages of many storms, generally looked absolutely "fit." That we shall have to come to metal construction ultimately, owing to the problem of supplies of wood, no one will deny. But there is much to be said for Mr. Walker's contention, in a letter published in FLIGHT some time ago, that so long as we learn how to make efficient and cheap metal spars, there is no reason why the rest of the machine should not be made of wood. It is the long lengths of silver spruce which are difficult to get. The smaller stuff, such as is used for wing ribs, etc., can still easily be obtained, and certainly the D.H.50J seemed to show that the ply-wood skin fuselage will stand up remarkably well. Provided, therefore, that ample supplies of ply-wood are obtainable in case of war, there does not appear to be quite the urgent necessity of making every last small part of an aeroplane of metal.

For the first time in history a radial air-cooled engine was used on a flight of this nature, and the Armstrong-Siddeley "Jaguar" appears to have done all that any aero engine, of whatever type, could be expected to do. We had a short chat with Cobham on Saturday, and he stated that never at any time had there been the slightest suggestion of engine trouble. The extreme temperatures met with must have been trying to the engine, not to mention that more than once, when flying in sandstorms, the air intakes were smothered in sand. Yet the engine ran as well as ever. The flight has thus proved the qualities of the radial air-cooled, a type of aero engine which many regard as the type of the future. Altogether, the flight has demonstrated the superb qualities of British aircraft material, not to mention the equally British determination and stamina of the crew, to whom the very greatest credit is due Our thanks to them all for their wonderful demonstration.

◆ ◆ ◆

Another Radial Triumph

March seems to be a month of triumphs for the radial air-cooled engine. The "Jaguar" has completed something like 17,000 miles under the most trying conditions, and the Bristol "Jupiter" has completed an even longer period under, perhaps, rather less severe conditions, but nevertheless sufficiently searching to discover any defects that might have been present. That not a single defect was discovered after nearly 226 hours' flying at an average of about 72 per cent. of full power is proof positive of the soundness and reliability of Mr. Fedden's design and Bristol workmanship. The engine was officially sealed before the start of the test, and the machine and engine then handed over to Imperial Airways to be tested under normal operational conditions, still under the supervision of the A.I.D. What made the demonstration all the more impressive was the fact that the Bristol Aeroplane Company had such faith in the "Jupiter" that at the outset the statement was made that a flight of 25,000 miles without replacement would be attempted. That the attempt succeeded shows that those responsible for the engine know its capabilities to the full, and that, therefore, if a certain performance is promised it will be attained. That is a reputation which any firm might well envy, but it is one in keeping with the traditions of the Bristol Aeroplane Company.

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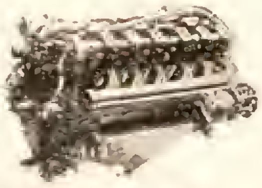
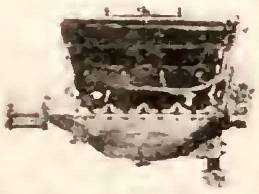
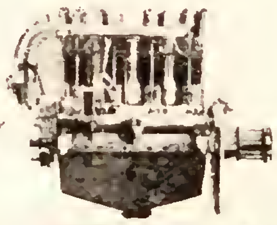

Rolls-Royce Eagle 8

Martinsyde F.4.

D.H.9A

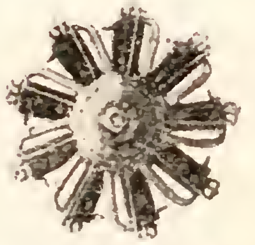

300 h.p. Hispano Suiza


27/60 h.p. "Cirrus"

Avro type 504K

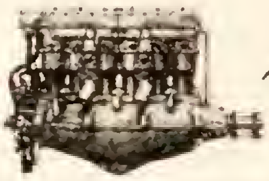
Bristol Fighter

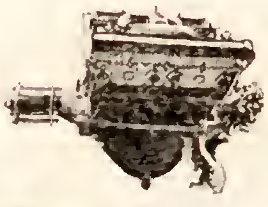
200 h.p. B.R.2.


110 h.p. Le Rhone

D.H.9

Sopwith Snipe


240 h.p. Siddeley "Puma"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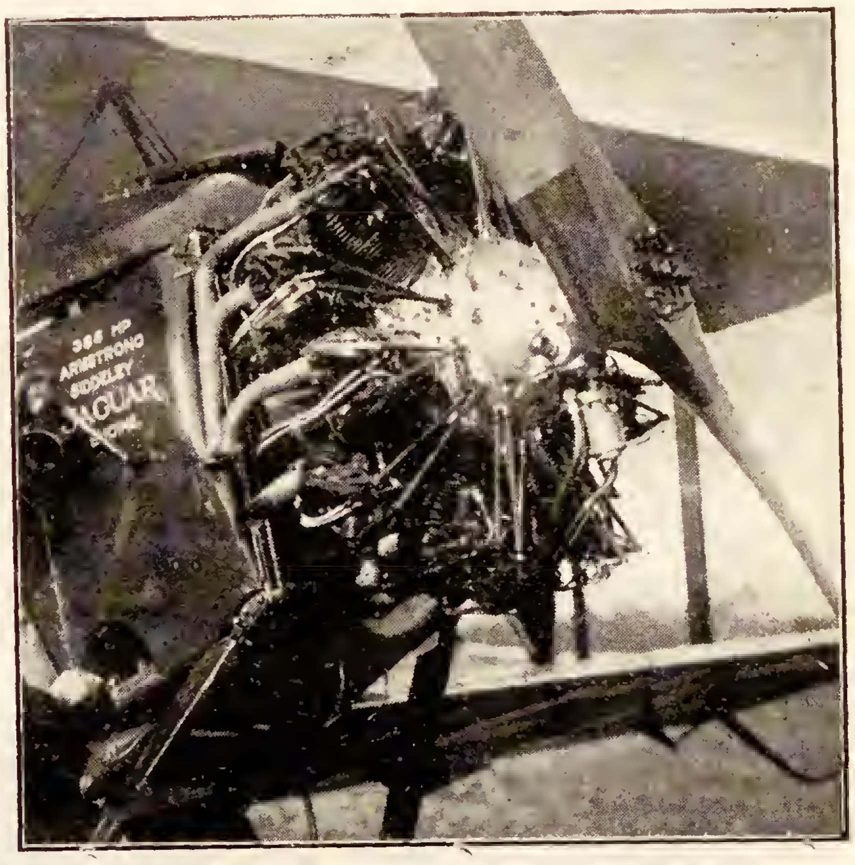
Alan Cobham's Splendid Achievement

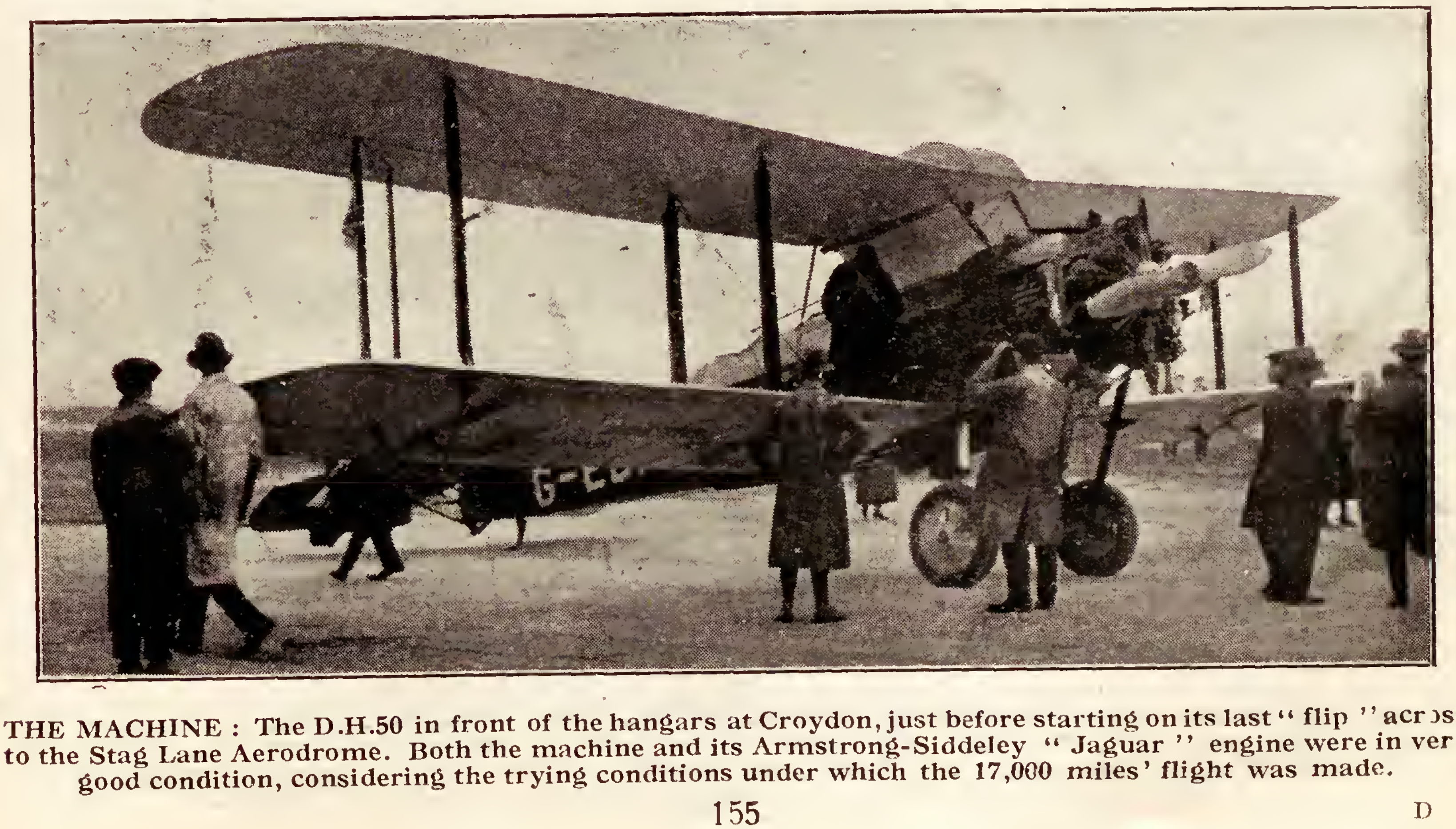
Having beaten, by two days, the s.s. "Windsor Castle," which left Cape Town on the same day as he, Alan Cobham has concluded his remarkable dash home on the equally remarkable De Havilland-Siddeley "Jaguar" combination. Even so, in his own words, although he had taken 15 days against the liner's 17, the odds were against him, for whereas the liner could travel the full 24 hours a day, Cobham and his companions, A. B. Elliott and B. W. G. Emmott, had to stop at some place *en route* every night—whilst they lost three days at least owing to impossible weather conditions and a slight mishap.

We will first continue the story of the flight from where we left them at Sollum last week, and then describe the extraordinary scenes at Croydon on his arrival. Although weather reports from the Mediterranean were by no means ideal Cobham was ready and anxious to continue the flight to Athens across the Mediterranean, but the start was delayed in order to repair a broken tail skid. As it happened this delay was probably a blessing in disguise, for shortly after a fierce gale sprang up in the North Mediterranean, and it is doubtful

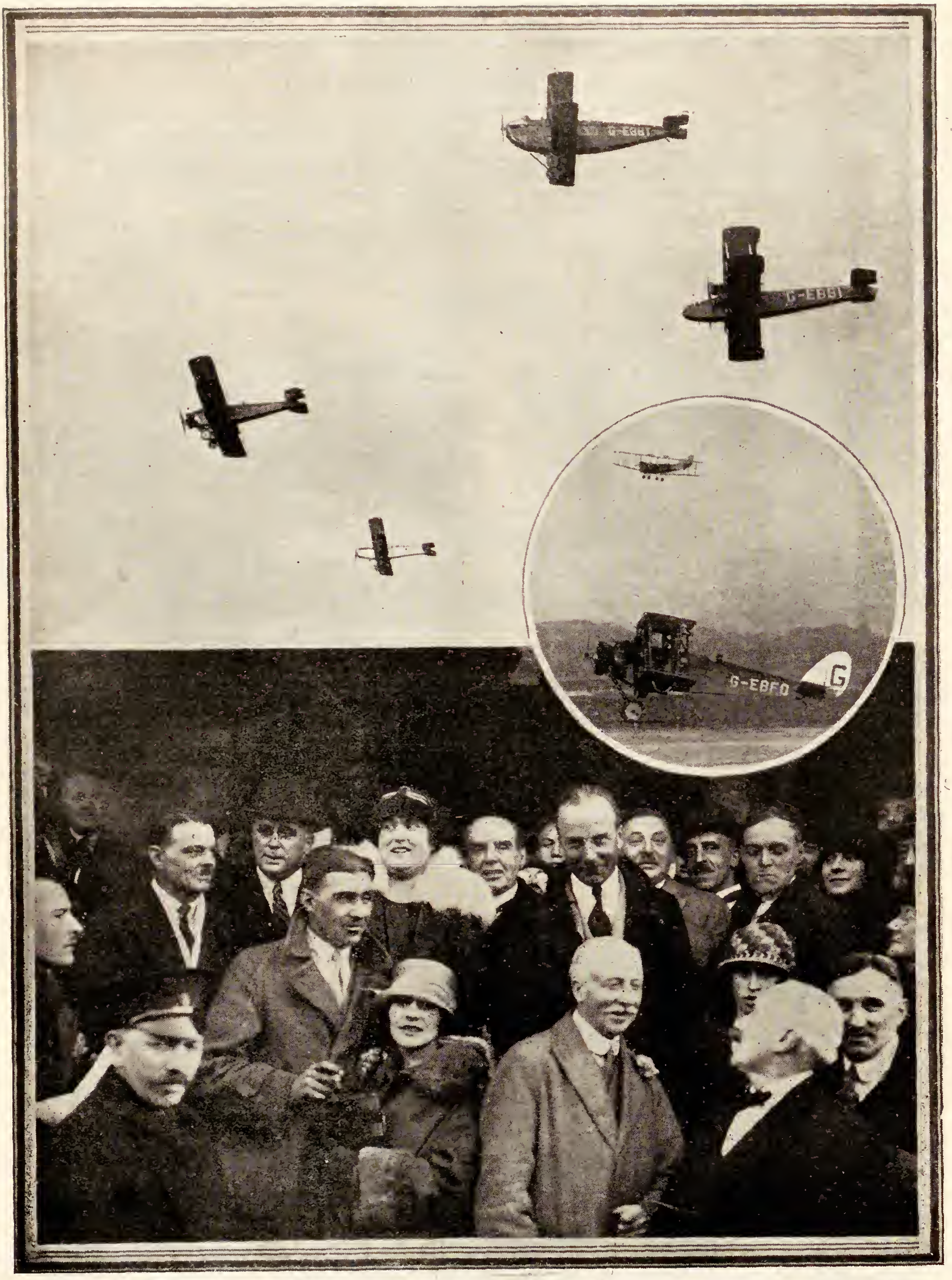
HOME AGAIN: Mr. Alan J. Cobham (right) and Mr. Elliott, his engineer, photographed at Croydon shortly after their arrival. Both looked sunburned and fit after their long flight.



LONDON—CAPE TOWN—LONDON: The 385 h.p. Armstrong-Siddeley "Jaguar" engine which came through the 17,000 miles and all variations of climatic conditions, without a hitch.



THE MACHINE: The D.H.50 in front of the hangars at Croydon, just before starting on its last "flip" across to the Stag Lane Aerodrome. Both the machine and its Armstrong-Siddeley "Jaguar" engine were in very good condition, considering the trying conditions under which the 17,000 miles' flight was made.



[Flight *Photographs*

HOME FROM THE CAPE: These three photographs tell the story of the home-coming of Cobham, Elliott and Emmott on Saturday of last week from their flight to Cape Town and back in a D.H.50 fitted with Armstrong-Siddeley "Jaguar" radial air-cooled engine. The upper photograph shows the D.H.50 arriving over Croydon aerodrome, followed by some of its escorting machines. Inset is seen the "50" actually landing after its 17,000 miles' flight, and the lower photograph shows a happy group, in which may be recognised Mr. Loader, Sir S. Instone, Mr. Emmott, Mrs. Cobham, Sir Charles Wakefield, Mr. Cobham and his father (in the foreground), Mr. Rodgers, and Mr. Elliott.

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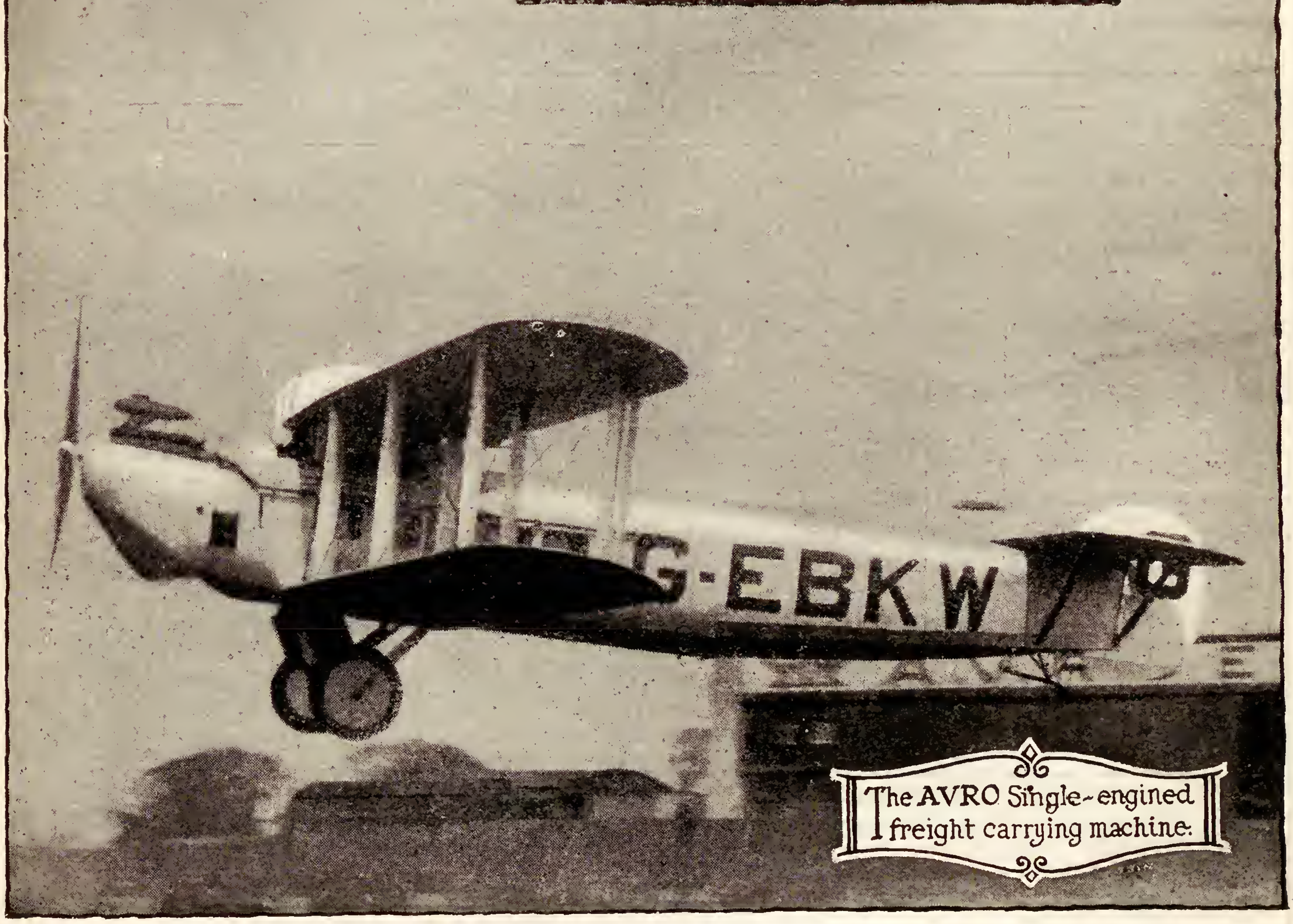

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		Length	Bore	
		m/m	m/m	m/m
375 × 55	168	111.12	25.4	Central
300 × 60	16	111.12	25.4	Central
450 × 60	30	89.	31.75	Central
„	172	130.	38.09	Central
575 × 60	21	160.	28.	Central
„	186	120.	34.92	Central
„	190	150.	38.09	Central
650 × 65	78	178.	44.45	132/46
„	79	178.	44.45	Central
„	100	178.	38.09	132/46
„	101	178.	31.75	132/46
600 × 75	21	160.	28.	Central
„	186	120.	34.92	Central
„	190	150.	38.09	Central
700 × 75	78	178.	44.45	132/46
„	79	178.	44.45	Central
„	100	178.	38.09	132/46
„	101	178.	31.75	132/46
700 × 100	77	178.	44.45	132/46
„	92	185.	55.	135/50
„	95	185.	55.	Central
„	99	178.	38.89	132/46
700 × 100	112	150.	38.09	Central
„	176	178.	44.45	Central
„	179	178.	55.	132/46
650 × 125	119	178.	55.	132/46
„	147	178.	55.	Central
„	188	120.	34.92	Central
750 × 125	77	178.	44.45	132/46
„	92	185.	55.	135/50
„	95	185.	55.	Central
„	99	178.	38.89	132/46
„	112	150.	38.09	Central
„	176	178.	44.45	Central
„	179	178.	55.	132/46
800 × 150	161*	185.	55.	135/50
„	162*	185.	55.	Central
„	163*	185.	66.67	135/50
„	169†	185.	55.	135/50
„	177	185.	55.	135/50
„	183	185.	55.	Central
„	211*	185.	60.32	135/50
1000 × 150	167	185.	55.	125/60
„	174	250.	80.	Central
„	182	185	55.	Central
1000 × 150	187	220.	66.67	Central
„	201	185.	60.32	125/60
„	210	185.	60.32	Central
1000 × 180	148	220.	80.	Central
„	149	185.	55.	Central
„	155	220.	66.67	Central
„	166	185.	55.	125/60
900 × 200	107	185.	55.	Central
„	108	185.	55.	125/60
„	128	220.	66.67	Central
„	137	250.	80.	Central
„	157	185.	80.	Central
„	202	185.	60.32	Central
1100 × 220	134	220.	66.67	Central
„	136	250.	80.	Central
975 × 225	192	185.	60.32	Central
1250 × 250	133	250.	80.	Central
„	154	304.8	101.6	Central
1500 × 300	115	304.8	101.6	Central
„	126	304.8	152.4	Central
1750 × 300	139	400.	152.4	Central
„	191	350	150.3	Central

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(346)

[Flight *Photographs.*

AT CROYDON : In the upper photograph Mr. Cobham is seen being welcomed home by Commander Perrin, on behalf of the Royal Aero Club. In the centre Mr. Cobham is "delivering the goods" from the door of the Customs House, and below is a sea of upturned faces of the crowd listening to Cobham's little speech.

if they would have been able to fight against it and reach Athens in safety.

However, on March 11, the machine having been stripped of all extra weight (including Emmott's camera gear, which was sent on by ordinary methods) in order to take in some extra petrol for the 500 miles over-sea journey, they took off in good style and headed for Europe. Visibility was bad, and very soon after leaving the African coast they had no landmark to guide them and had to depend upon a compass course. After flying thus for about three hours, against a strong headwind and through numerous showers, Cobham expected to sight the island of Crete—but there was no sign of it, even after a further half-an-hour's flying. Thinking he had gone slightly off his course Cobham steered a little more to the north, but still without result, and just as they were beginning to feel anxious the faint shadow of the island of Cythera came into view—so they had passed over Crete without seeing it! Visibility at this locality, it should be mentioned, is usually very good. As they approached the mainland of Greece they struck very bumpy weather, and had to fly out over the sea again to escape it. However, shortly after they landed at Athens in bright sunlight.

They left Athens at 6.40 a.m., in a snowstorm, on March 12, and successfully accomplished the 840 miles to Pisa, and on the following day, March 13, they set out on the final stage to London, a distance of just over 900 miles. On the first section they experienced one of the biggest thrills of the flight, when, climbing to 12,000 ft., they flew over the Alps, the brilliant sun-lit snowy mountain peaks standing out all around them with wonderful clearness.

Having safely negotiated the Alps they descended once more into clouds and poor visibility and landed at Lyons. After a short stay here they hastened on for the final 475 miles, weather conditions being poor until reaching the Channel, when the sun shining brightly on the cliffs of Dover presented a hearty welcome home to the three airmen. Without stopping they hurried on and eventually landed at Croydon, at 4.20 p.m., having accomplished a splendid day's flying—over 900 miles in 8 hours 20 mins.

THE ARRIVAL AT CROYDON

In the meantime, considerable preparations had been made for the reception of the air travellers on their arrival at the Croydon aerodrome. Invitation cards had been sent out to those directly interested in the flight, and to a number of prominent personalities in the aviation world, as well, of course, as to representatives of the press. These cards bore a request to the Civil Aviation Traffic Officer, familiarly known as "Mr. Cato," that he would kindly admit bearer to the secret places of the heart, otherwise the terminal aerodrome, of Government-subsidised "commercial" aviation. Curious how the love of red tape clings. Even during these winter months, when one may, with any luck, see two or three machines arrive and depart, a special dispensation is required before one may set foot on the sacred tarmac inside the fence. The invitation card itself was not, however, sufficient. It had to be stamped on the back before it was valid. Here it must be pointed out that the officials in charge did the stamping with courtesy and despatch, and got the tedious business over with a minimum of fuss and loss of time.

FIRST GREETINGS: These two photographs show the crowds surging around the machine as soon as it came to a standstill on the Croydon Aerodrome. In the upper photograph, Mr. Cobham is being hailed by friends, while in the lower picture he is seen being carried to the Customs House.

Napier engines on top!

"To-day the Napier aero engine is the best and the leading aviation motor of the world, with the motto of the Royal Marines, '*Per mare, per terram,*' as its slogan of efficiency for aeroplanes that traverse land and sea, alighting with equal success on either. But that, after all, is the pilot's job. The engine has to be his shield in its never-failing regularity of performance. To-day, some huge total of flying mileage has been effected all over the world, and, according to the latest available statistics, Napier engines come out on top for mileage flown with minimum of trouble. The Napier Lion aero engine is indeed well named, as it truly impersonates this heraldic symbol of Great Britain."

Sketch, 3.2.26

The Napier "Lion" aero engine was used by Major Franco on his wonderful flight from Spain to South America when he covered 6,259 miles in 60 flying hours.

NAPIER

The Finest Aero Engine in the World

D. NAPIER & SON LTD.
ACTON, LONDON, W. 3.

Blackburn
AIRCRAFT

THE ONLY ACCIDENT DURING 3 YEARS

A BLACKBURN "SWIFT" AFTER LANDING ON A MOUNTAIN SIDE IN A DENSE FOG SOMEWHERE IN EUROPE

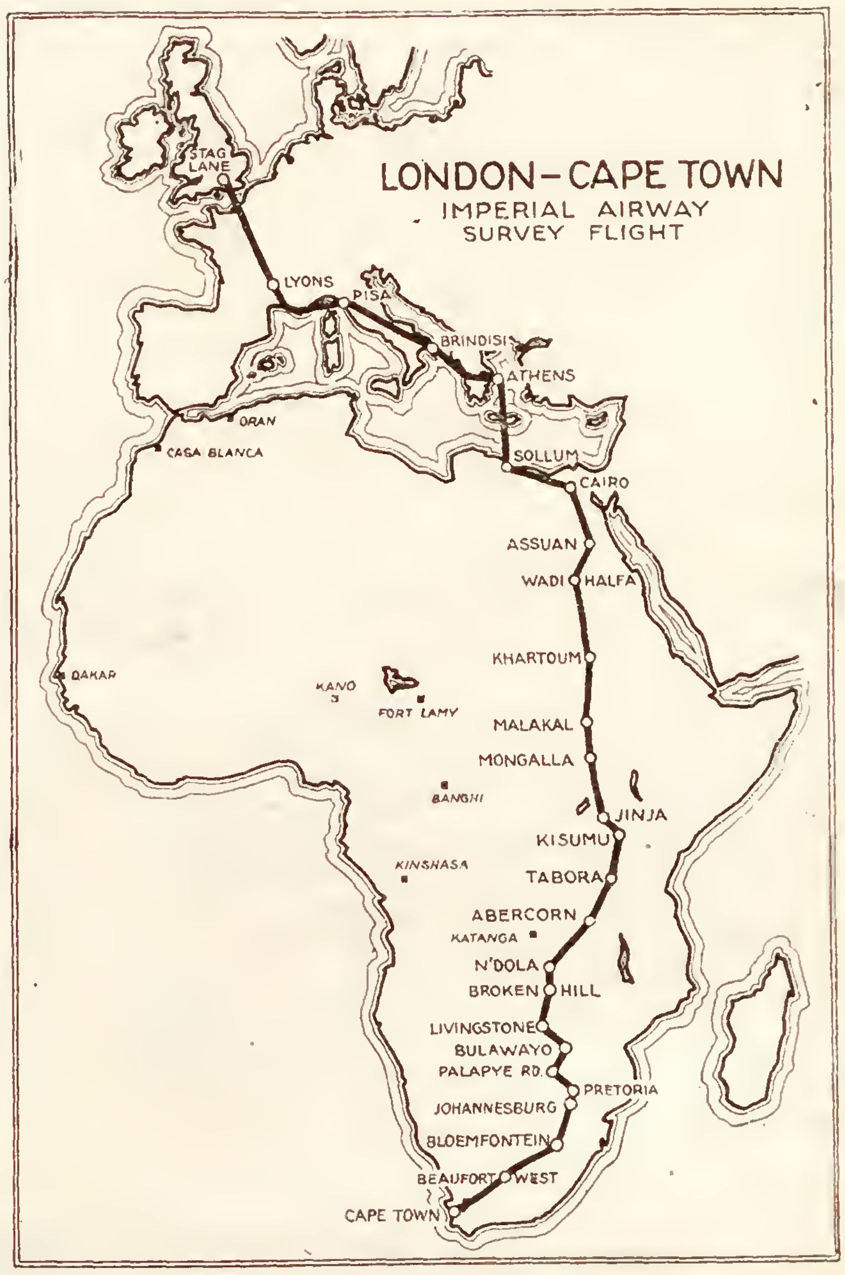
LONDON OFFICE: Pemberley House, [illegible] Strand W.C. 2. Phone: Central 7522

THE BLACKBURN AEROPLANE & MOTOR Co. Ltd. Olympia Leeds England. Grams: Propellers Leeds

Our card having been stamped, we at last were duly qualified to enter the portals of the "air port," where in spite of the relatively early hour, quite a large crowd had already gathered. Private motor-cars, tram-cars of sorts, and omnibuses were busy conveying to the aerodrome the hosts wishing to witness the triumphant return of Mr. Cobham and his companions. The roads converging on the aerodrome were lined with cars, the new Brighton road being in particular a favourite "grand stand." The public enclosure on the aerodrome was gradually filling up, and sauntering around in front of the hangars and offices were the privileged ones who had provided themselves with cards, duly stamped, of course (the cards, not the visitors). Shortly before 3 p.m., a small squadron of machines hove in sight, which later proved to be a fleet of six de Havilland "Moths" and a D.H.9, coming over from Stag Lane in order later to go out and meet Cobham "somewhere in Kent."

Imperial Airways had arranged to send two or three machines out to meet Cobham, and seats were being booked at £4 a time for the trip. One wonders whether the Government subsidy was needed to make this particular flight "commercial," or whether it was one of those rare occasions when aviation paid without a subsidy.

By a piece of very good fortune, the writer of these notes met Mr. Loader of the de Havilland Company, who was kind enough to extend an invitation to go out and meet Cobham in one of the "Moths." Being of a somewhat modest and retiring nature, and without any intention of being rude, we make inquiries as to who is to be the pilot. On being told that the Editorial "We" is to be honoured by having as pilot none less than Major C. K. Cochran-Patrick, D.S.O., M.C., we hide our blushes and gladly accept the invitation. It is arranged that the six "Moths" shall fly in two formations of three each, the one to which our machine belongs being led by Captain Geoffrey de Havilland himself, carrying as passenger Mrs. Cobham, and the other by Captain Hubert Broad. Shortly before 3.30 Broad's formation gets away, followed a few minutes later by de Havilland's. The six machines show a remarkably good climb, in spite of the relatively low power of their "Cirrus" engines, and soon Croydon is left behind and we are heading south-east. Climbing gradually, and cruising at about 65 m.p.h., the two miniature "formations," with Broad's a couple of miles in the lead, look very pretty in the bright sunshine, but although the ground is clearly seen from 2,000 ft., the horizontal visibility is none too good, and a climb to 3,000 ft. does not improve matters. By the time the "squadron" has reached the neighbourhood of Sevenoaks, Broad commences a large left-hand turn, and the rest of us follow suit. The next half-hour or so is spent in thus circling around, the pilots in the meantime keeping a sharp lookout for Cobham. Other machines arrive, one or two of which are identified as Handley Page's. Yet others spring up from nowhere, apparently, easily recognised as being de Havillands, but too far away for the exact type to be identified.



LONDON - CAPE TOWN - LONDON: Sketch map showing the route taken by Alan Cobham on the out and home journeys.

In the meantime the sturdy little "Cirrus" of our own "Moth" is humming away merrily, and so reassuring is its note that never for a moment does one have the feeling that it might stop. The front cockpit of the "Moth" is very comfortable, and as the "joystick" has been removed and the foot-bar disconnected, one can be quite comfortable,

EXAMINING THE ESCORTS: Visitors surround the D.H. "Moths," six of which went out to meet Cobham over Sevenoaks, one of them, piloted by Capt. Geoffrey de Havilland, carrying Mrs. Cobham. Owing to poor visibility, the "Moths" failed to get close to Cobham's machine, and arrived back at Croydon some little time after Cobham had landed.

the only object in the cockpit that is taboo being the pupil's throttle control, from which one studiously keeps away. Suddenly Maj. Cochran-Patrick turns out of his place in the formation, hitherto carefully maintained, and heads for "Broad's bunch." The revolutions indicator creeps up to over 1,800, and the air-speed indicator shows rather better than 90 m.p.h. One wonders what is up. The air seems to be full of machines, all looking "deaitchy" but not near enough to be definitely identified. For a fleeting moment one has the impression that one of the D.H.'s has a radial engine, but then the silhouette changes and it is impossible to be certain. Failing to catch up with Broad, we return to our own formation, this time on the left flank, and all the machines make for home, our "Moths" bringing up the rear. Biggin Hill is passed, and soon we are back at Croydon, only to find that Cobham's machine is already standing on the ground, surrounded by thousands of people.

After alighting, it is discovered that Maj. Cochran-Patrick did see Cobham's machine, and that his breaking away from the formation was done in an endeavour to catch Broad and signal to him the fact that Cobham had arrived over Sevenoaks. Our "Moth" was not, however, able to overtake Broad's machine, and so the little squadron was unable to get back to Croydon in time to comply with the blackboard sign exhibited before the start, which intimated that "escorts should land first."

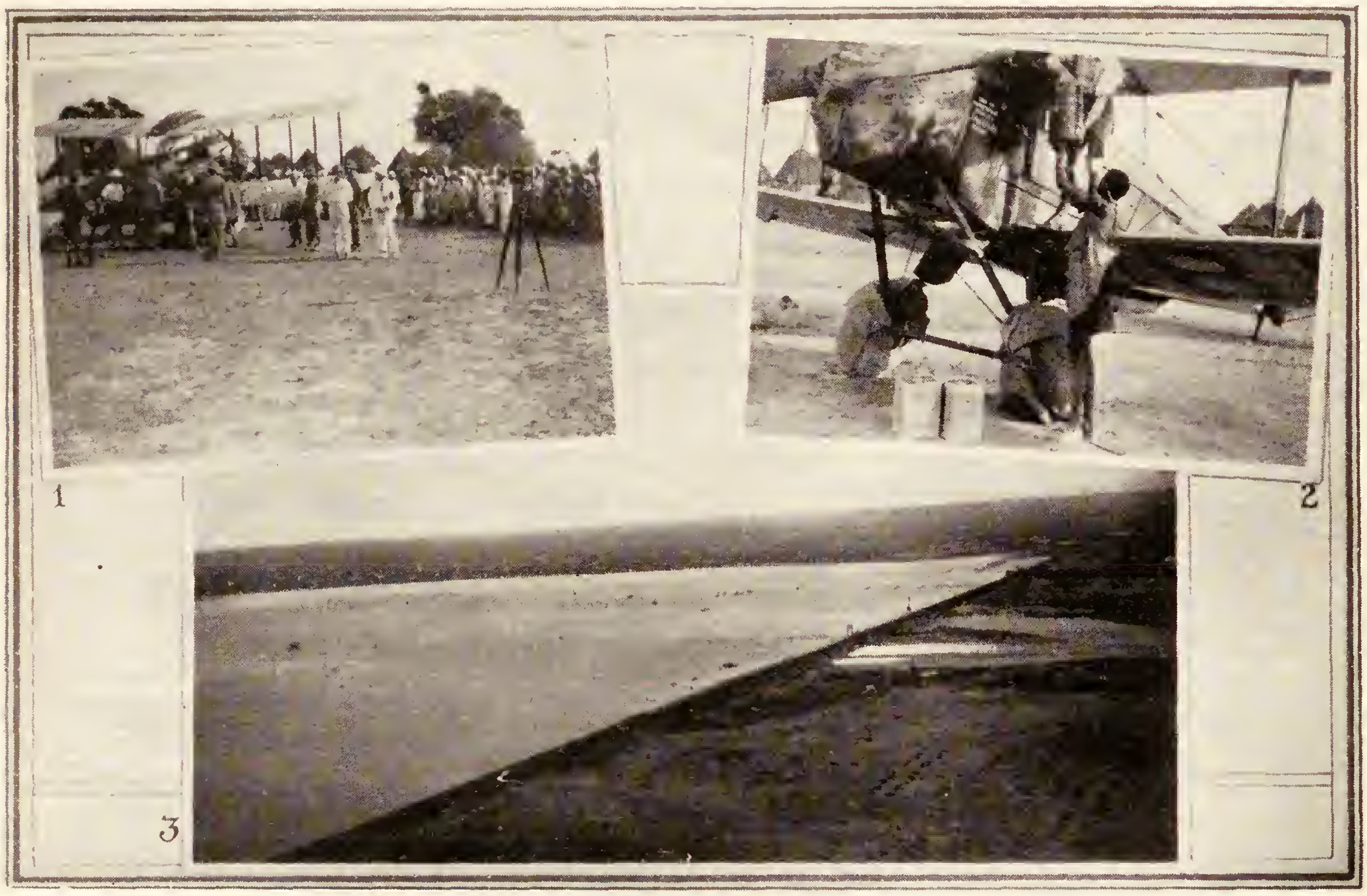
At Croydon there was a great to do. When Cobham landed the crowd broke through the barriers, the few policemen being unable to restrain them, and surged over the aerodrome in an endeavour to get a good view of Cobham and his companions. For a time it began to look serious, and the famous fliers were nearly mobbed. Ultimately, however, the police and others succeeded in getting the aviators through to the customs-house, whence, after a brief breathing spell, Cobham emerged, to the great delight of the multitude.

Sir Philip Sassoon, Under-Secretary of State for Air, made a brief speech of welcome on behalf of the Air Ministry, to which Mr. Cobham replied in an equally brief speech. What they had done, Cobham said, was nothing heroic. The success of the flight was mainly due to good organisation. He gave most of the credit to his engineer, Mr. Elliott, whose task it had been to look after the engine and machine and see to it that they were in perfect order when wanted. For his own share he claimed no kudos, and said that the many pilots surrounding him could all have done as well as he had, given the opportunity.

Then followed another struggle to get from the customs-house to the Trust House Restaurant. At last a way was cleared, and Cobham and his companions disappeared "behind the scenes." In an inner room a few friends had gathered together, apparently under the chairmanship of Mr. Handley Page, and Cobham and his companions were toasted in a suitable beverage.

Sir Charles Wakefield in a short speech thanked Cobham for what he had done, and for the splendid example which he had set for others to follow. Sir Samuel Instone proposed the toast of Mr. Elliott, who, he was glad to say was an old Instone Air Line man, and finally the health of Mrs. Cobham was drunk, Mr. Cobham exclaiming "Yes, to Mrs. Cobham for letting me go."

It might have been thought that this would finish Cobham's day; but not a bit of it. After a few minutes' stay in the Trust House he and Elliott embarked in the D.H.50 once more, and were followd by the escort of "Moths," and the little squadron flew across to Stag Lane, Cobham thus being back at his actual starting-point after having flown close upon 17,000 miles. Very soon afterwards a message was received that His Majesty the King desired to see Cobham at Buckingham Palace, and thither Cobham consequently hurried. His Majesty congratulated Cobham on his achievement, and upon hearing that Mrs. Cobham was waiting in the car, expressed the desire that she be called. The King then conversed with Mr. and Mrs. Cobham for a considerable time, and showed not only a very thorough knowledge of the details of the flight, but also a keen appreciation of the difficulties involved and the problems to be overcome before



LONDON-CAPE TOWN-LONDON: Some "snaps" taken by A. B. Elliott (the engineer of the party) on the outward journey. (1) The arrival at Malakal, Sudan. (2) A native helps to fill up with fuel. (3) An aerial view of the Sennar Dam recently opened to irrigate 1,000,000 acres of desert.

R. M. KINDERMAN
COLLECTION

"Mr. Cobham and his machine have come victoriously out of a wonderful feat of endurance, which proves—if proof were needed—that the British aeroplane and the British airman are as good as any in the world."

Leader, *Morning Post,* March 15th.

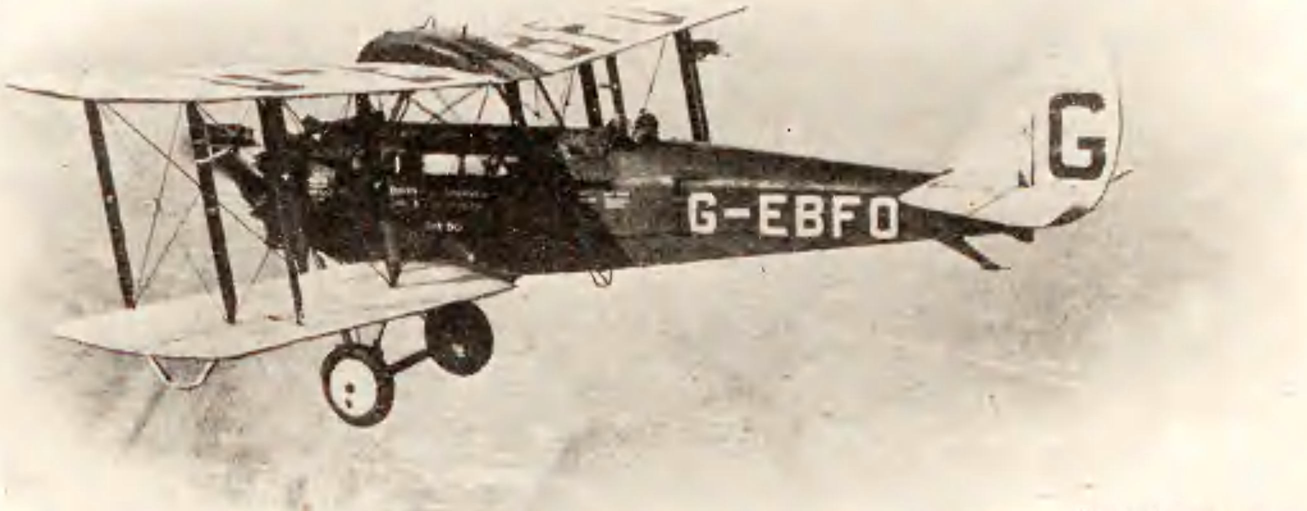


Photo by courtesy of the "Daily Mail."

The First Aeroplane to Fly from LONDON to CAPE TOWN AND RETURN.

The D.H. Type 50 J

385 H.P. SIDDELEY "JAGUAR" ENGINE
17,000 MILES——————170 HOURS.

The same aeroplane and engine were used throughout the flight. The homeward journey was made in less than 16 days. 80 flying hours at 105 miles per hour.

THE DE HAVILLAND AIRCRAFT CO., LTD.,
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(Specialists in Metal Float Construction.)

it becomes possible to start regular air services over portions of the route covered by Cobham.

In the evening Mr. Cobham broadcast from 2.LO a brief talk on his flight, which was so well delivered that not a single word was lost to the millions of listeners. In view of the fact that he had flown rather more than 900 miles since his breakfast in Pisa that morning, had been mobbed at Croydon, and had had an audience of the King, we are not at all certain that his talk from the London station was not one of his greatest achievements. Certainly nobody could have dreamt from listening to him that he must be dead tired, and one began to realise some of the qualities that make Cobham what he is.

And here on behalf of ourselves and our readers, we would add our quota of congratulations and appreciation to the thousands of others received by Cobham, Elliott and Emmott, and to the De Havilland Aircraft Co., Armstrong-Siddeley Motors, and all the other firms which collaborated in making this epoch-making flight a success.

In conclusion, we wish, once again, to draw attention to certain other factors in connection with the flight. First of all, it was financed entirely by private enterprise, and secondly, its object was to survey the London-Cape Town route with a view to the possibilities of air services along its various points, and also as propaganda for British aviation.

The construction of the special de Havilland 50 aeroplane, its Siddeley "Jaguar" engine, and the provision of all the equipment, supplies and finance required were accomplished by the united efforts of about twenty or more British firms. Thus, the De Havilland Co., who managed the organization of the expedition, received the wholehearted assistance and enterprising co-operation from the following firms :—Imperial Airways, Ltd., Armstrong Siddeley Motors, Ltd. ; the British Petroleum Co., Ltd. ; C. C. Wakefield and Co., Ltd. ; the British Thomson-Houston Co., Ltd. ; the Palmer Tyre Co., Ltd. ; the Robinhood Engineering Works, Ltd. (K.L.G. Plugs) ; the Hoffman Manufacturing Co., Ltd. ; the Aeronautical and Panel Plywood Co., Ltd. (the plywood supplied by this firm was the same plywood which was on the machine when it made its London-Rangoon-London flight) ; Wm. Mallinson and Sons, Ltd. ; Titanine-Emaillite, Ltd. ; J. Stone and Co., Ltd. ; S. Smith and Sons (M.A.), Ltd. ; Pinchin, Johnson and Co , Ltd. ; Earle, Bourne and Co., Ltd. ; Brunton and Son ; Accles and Pollock, Ltd. ; Brown Bros., Ltd. ; Henry Hughes and Son, Ltd. ; the Triplex Safety Glass Co., Ltd. ; and Pickford's and Hay's Wharf Shipping and Forwarding Co., Ltd.

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AMUNDSEN'S NORTH POLE AIRSHIP

Wireless Direction as Navigational Aid

The Italian airship "Norge 1," in which the well-known Polar explorer Amundsen is to attempt to fly from Europe over the North Pole to Alaska, and which will pass through London on its journey, will, it is claimed, be the most efficiently equipped airship from a wireless point of view which has ever taken the air.

By special arrangement with the Marconi Company, the vessel is to be equipped with transmitting apparatus which will enable the commander to keep in touch with either land or ship stations at distances up to 1,000 miles. Thus the airship will never be out of touch with the external world during its whole journey above the icebound solitudes of the Polar regions, and it is to be hoped that this very necessary equipment will *not*, as seems to be so frequently the case in expeditions of this sort, be discarded at the last minute in order to save weight, etc. Otherwise it may mean the same old story of days of anxiety with no news of the expedition.

Receiving apparatus specially designed to cover a wave-range of 300 to 25,000 m. will also be carried, whilst direction-finding apparatus will be installed which will be sufficiently sensitive to enable the navigators accurately to determine their course and direction even over the Pole itself, when the compasses will be of no navigational value, since all direction will be due south.

The wireless direction-finder will enable all the long-wave European and American stations to be picked up and oriented with ease, huge loops having been erected right round the envelope of the airship. By this means the sensitivity of the wireless directional apparatus has been made much greater than any hitherto employed on any aircraft.

The Marconi Company are making arrangements to forward any reports from amateurs of reception from the airship during its flight to the North Pole to the wireless officer with the expedition.

The airship has been reconditioned in Rome and has already successfully carried out some trials. When these are concluded it will fly via Marseilles, London, Leningrad and Norway to King's Bay, which will be the taking-off ground for the final flight across the Pole. When in England the airship will make a halt at Pulham.

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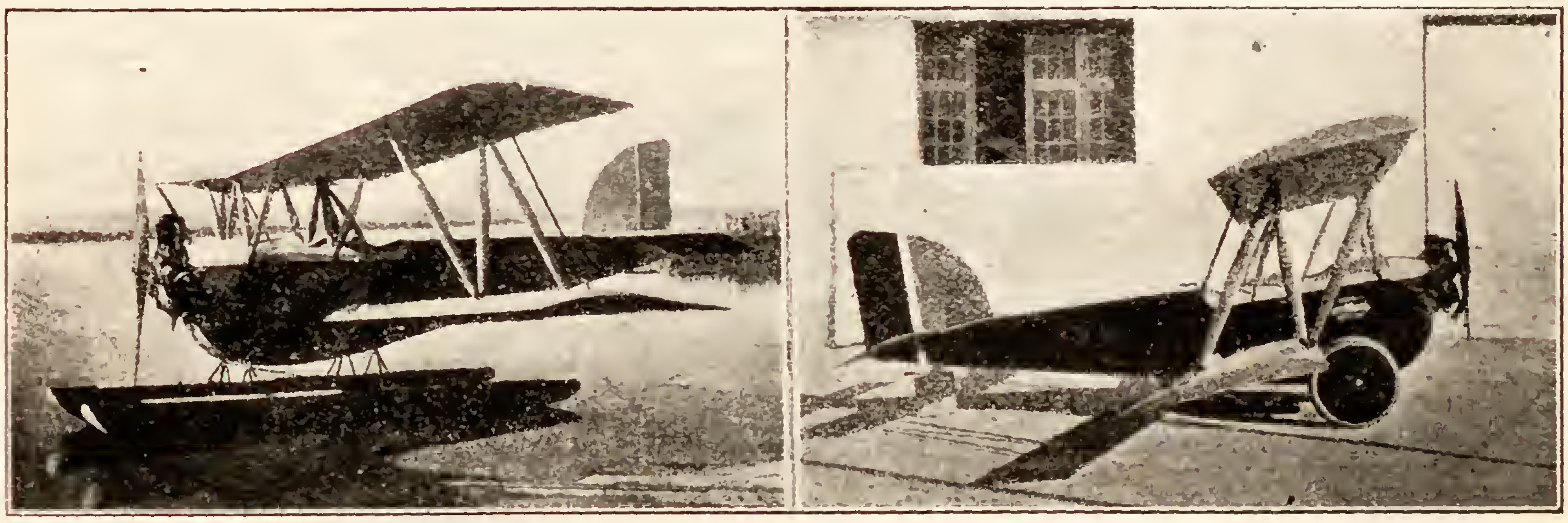
The "Other" African Flights

The four R.A.F. Fairey III.D biplanes, under Wing-Comdr. C. W. H. Pulford, which left Cairo for Cape Town on March 1, are making steady progress, although one or two delays have been experienced. Proceeding from Malakal on or about March 10, they flew to Mongalla, where slight magneto trouble to one of the machines prevented them from resuming the journey until March 12. Kisumu (Kenya) was reached on March 13.

On March 9, Lieut. Medaeto, the Belgian pilot, left Brussels on a Breguet XIX biplane in an attempt to fly to Kinshasa (Belgian Congo), as previously reported in Flight. He reached Belgrade the same afternoon, and, proceeding the next day, flew on to Athens. On March 11 he crossed the Mediterranean and landed at Cairo in the afternoon. Bad weather delayed him at Cairo until March 15, when he accomplished a nine hours' flight to Atbara. With him are Lieut. Verhägen and a mechanic, Coppens.



TWO MACCHI LIGHT 'PLANES : On the left the Macchi 20 Seaplane, which was classed first in the recent "Coppa del Mare," and the Macchi 20 land 'plane, which was classed second in the "Coppa d'Italia." Both types were fitted with 60 h.p. Lawrence air-cooled engines

Personals

Married

Francis Logan, Flight-Lieut. R.A.F., younger son of the late Mr. and Mrs. Edward Luxmoore, of Weybridge, was married on March 11 at All Saints, Ascot, to Dorothy Jane, daughter of the late J. T. Johnston and of Mrs. Johnston, of Nether Denton, Cumberland.

The marriage took place on March 9, at St. Peter's, Eaton Square, of Air-Commodore Felton Vesey Holt, C.M.G., D.S.O., R.A.F., third son of the late Sir Vesey Holt, of Mount Mascal, Bexley, and of Lady Holt, of 67, Cadogan Place, to Miss Marion Edith Dugdale, only daughter of Mr. and Mrs. James Henry Dugdale, of Cadogan Gardens, and Rowney Priory, Hertfordshire. The best man was Sqdn.-Ldr. J. Russell. Among those present were Air-Marshal Sir John and the Hon. Lady Salmond, Air Vice-Marshal Sir Geoffrey and Lady Salmond, Air Vice-Marshal Sir Philip and Lady Game, Air Vice-Marshal and Mrs. Brooke-Popham, Wing-Commander and Mrs. Gould, Group-Captain and Mrs. Mills, Sqdn.-Ldr. and Mrs. Ridley, Wing-Commander and Mrs. Garrod, Wing-Commander and Mrs. Pretyman, Group-Capt. the Rev. W. and Mrs. Moffat, etc. Representatives of the Central Flying School, Upavon, formed a guard of honour.

To be Married

The engagement is announced between Flight-Lieut. Thomas Arthur Warne-Browne, D.S.O., R.A.F., only son of Mr. and Mrs. Arthur Warne-Browne, of Shiplake, and Ruth, younger daughter of Mr. and Mrs. Charles E. Nicholson, of Lee-on-the-Solent.

The engagement is announced between Cecil George Wigglesworth, R.A.F., second son of Mr. George Wigglesworth, B.A., B.Sc., and Mrs. Wigglesworth, of Brighton, and Peggy, youngest daughter of the late Arthur Cade Bemrose and Mrs. Bemrose, of London and the Isle of Wight.

Deaths

Flying Officer E. L. W. H. Alms (Bob), R.A.F., who died on March 1 at Risalpur, as the result of a bombing accident, was the second son of Mr. and Mrs. Edward T. Alms, Windsor Lodge, Taunton. His age was 26.

Benjamin Caillard, who died on March 5, at Karachi, India, as the result of a flying accident, was the son of Mr. and Mrs. Esmond Caillard, of Brighton.

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THE AIRSHIP CLUB

A meeting of the Committee of the Airship Club, held at 3, Clifford Street, on March 5. The following members were elected :—Lieut. W. C. de M. Leathes, R.N. (retired) ; T. Davys Manning, Esq., L. Winter, Esq., F. T. R. Prier de Soane, Esq., Edward Cooper, Esq., T. Grierson, Esq., A. G. Galloway, Esq., R. F. Granger, Esq.

Associate member : Miss Stella Wolfe Murray.

It was resolved that members wishing to take part in the Gordon Bennett balloon race be asked to forward their names to the Secretary and the crew would then be selected by the committee.

Draft rules of the club and Memorandum of Association for Airship Clubs, Ltd., were considered, and it was decided to obtain expert advice on their form before the next meeting.

The 80,000 cub. ft. balloon "Bee" has been entered by the Airship Club in the Gorden Bennett balloon race which starts on May 30 from Antwerp, Belgium. A crew of two is required, one of whom must be a qualified pilot. Members wishing to take part in the race are requested to furnish the following information :—(1) Whether they desire to fly as pilot or passenger. (2) Previous experience. (3) Approximate age and weight. (4) What proportion of the travelling expenses for themselves and the transport of the balloon they are prepared to pay. (As a rough guide, a member who has taken part in four Gordon Bennett races is of the opinion that these expenses might amount to £50 per person, but more probably half that sum).

On receipt of the above information a crew to represent the club will be selected by the committee.

Gas for inflation of the balloon is provided free. It is hoped that as many members as possible will assist at the start of the race.

F. L. M. Boothby,
Hon. Secretary

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New Life-Saving Suit Demonstrated.

An interesting demonstration with a new form of life-saving or buoyant clothing, designed by Major H. H. Evans, was given at the City of Westminster Swimming Baths on March 12. The feature of this clothing consists of a patent "aerated" rubber known as "Mousse," or "Foam" rubber, the composition of which renders it extremely buoyant and of such light weight that it is especially adaptable as a lining for garments and other devices for life-saving purposes. Volume for volume it is five times lighter than cork and considerably more durable. It further possesses calorific properties that provide great protection from cold. Thus, it is claimed to be particularly suitable for use in clothing for airmen. A combination suit for airmen, which in general appearance did not differ from the normal aviation suits, was demonstrated, in order to show that the wearer, falling into the water, could float in a vertical position, breast high and use his hands and arms without difficulty. Considering that this suit only weighed about 8 lbs., it was certainly remarkably buoyant, and the demonstrator floated with ease and well out of the water. A variety of other garments, to suit various conditions were successfully demonstrated, but unfortunately pressure on our space prevents us from saying more than that we think this "suiting" is worthy of investigation by those interested, and that further particulars may be obtained from Major H. H. Evans, 24, Craven Street, Charing Cross, London, W.C.2.

Lithuania to Build Aeroplanes

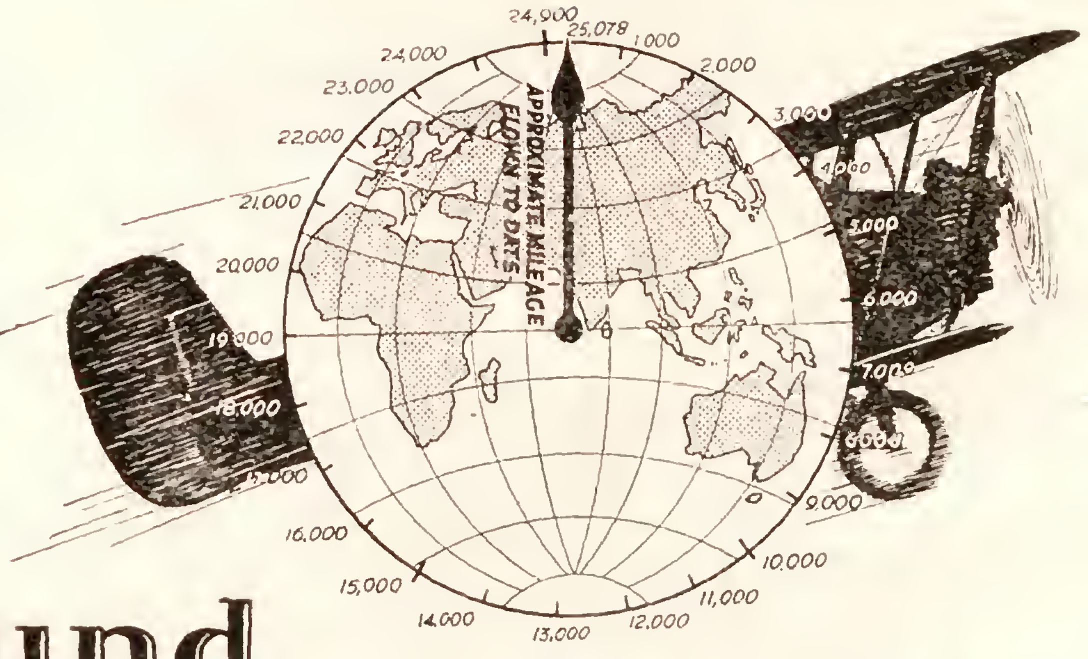
Lithuania is the latest country to commence the construction of their own aeroplanes. A local firm of Linenau and Co. have, under the supervision of a German engineer, F. H. Hentzen, an airman, who, in 1922, won a record for gliding designed and built a two-seater machine, with a speed of 160 m.p.h. This machine is capable of reaching a height of 17,000 ft. in 17 mins., whilst with the exception of the engine, the whole machine has been manufactured entirely in Klaipeda, Lithuania. It is significant as showing the reputation of British engineering that it has been decided in this, the first machine built in Lithuania, to fit one of the latest Napier "Lion" aero engines.

Draughtsmen for Airships

The Air Ministry announces that it is desired to fill certain vacancies for unestablished draughtsmen at the Royal Airship Works, Cardington, at the earliest practicable date. The Admiralty have called for reports giving the names, qualifications, and experience of any temporary draughtsmen who are about to be, or have recently been, discharged, who desire to be considered for these appointments, and who can be well recommended, distinguishing between ex-Service and non-Service men.

Relativity

On March 9 a record flight between Croydon and Le Bourget was accomplished by Capt. A. S. Wilcockson in an Imperial Airways Handley-Page "Hampstead" (three Siddeley "Jaguars") with 11 passengers, when he covered the 205 miles in 1 hour 26 minutes. In contrast to this, Capt. G. P. Olley, when flying from Cologne to Croydon the following day, took eight hours to complete the trip, which normally occupied 3½ hours, and at one portion of the journey a slow goods train travelling beneath him overtook the aeroplane!



Around the World on Shell

—with a Sealed Engine

TO test the endurance and reliability of the Bristol "Jupiter" Air-cooled Engine, a Bristol Bloodhound Biplane began, on January 4th, 1926, a series of endurance flights between Bristol and Croydon. The engine was sealed officially by the Aeronautical Inspection Directorate.

On March 8th, 1926, the test was completed, the biplane having flown 25,078 miles, equivalent to the circumference of the earth at the equator, in a fraction under 226 hours, without any engine replacements or renewals.

In subjecting the reputation of their engine to this arduous test, it was vitally important for the Bristol Aeroplane Co. to choose an absolutely reliable petrol. The only petrol used for the entire test was Shell Aviation. And the unqualified success of the test proves that they chose well.

SHELL
AVIATION SPIRIT

S. 88

LONDON to CAPETOWN and BACK.

Alan Cobham's ch-making Flight.

ARMSTRONG SIDDELEY

JAGUAR

AIRCOOLED ENGINE.

ARMSTRONG SIDDELEY MOTORS LIMITED.
(Allied with Sir W. G. Armstrong Whitworth & Co., Ltd.)
Works and Aerodrome: Coventry.
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TRIUMPH
of
AIR COOLING

THROUGH sand and rain storm, over the sweltering African Jungle and above the snow-clad peaks of Europe, the air-cooled Jaguar faced extremes of heat and cold—day after day—without a falter.

Proof that the air-cooled Jaguar is the safest, simplest and therefore the most reliable and economical engine of the air.

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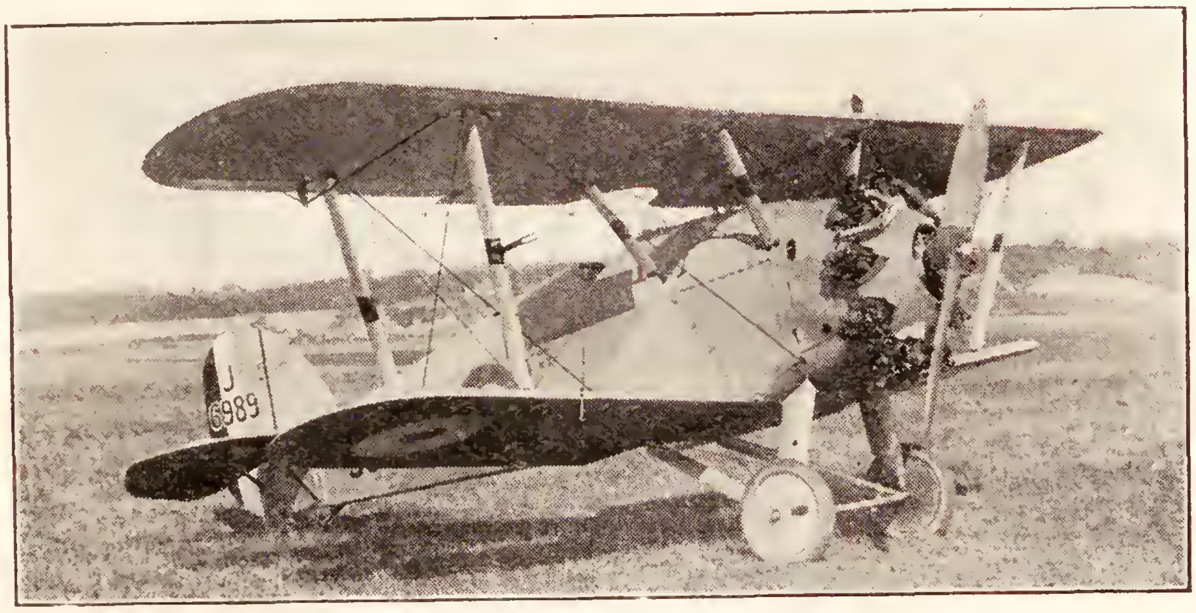

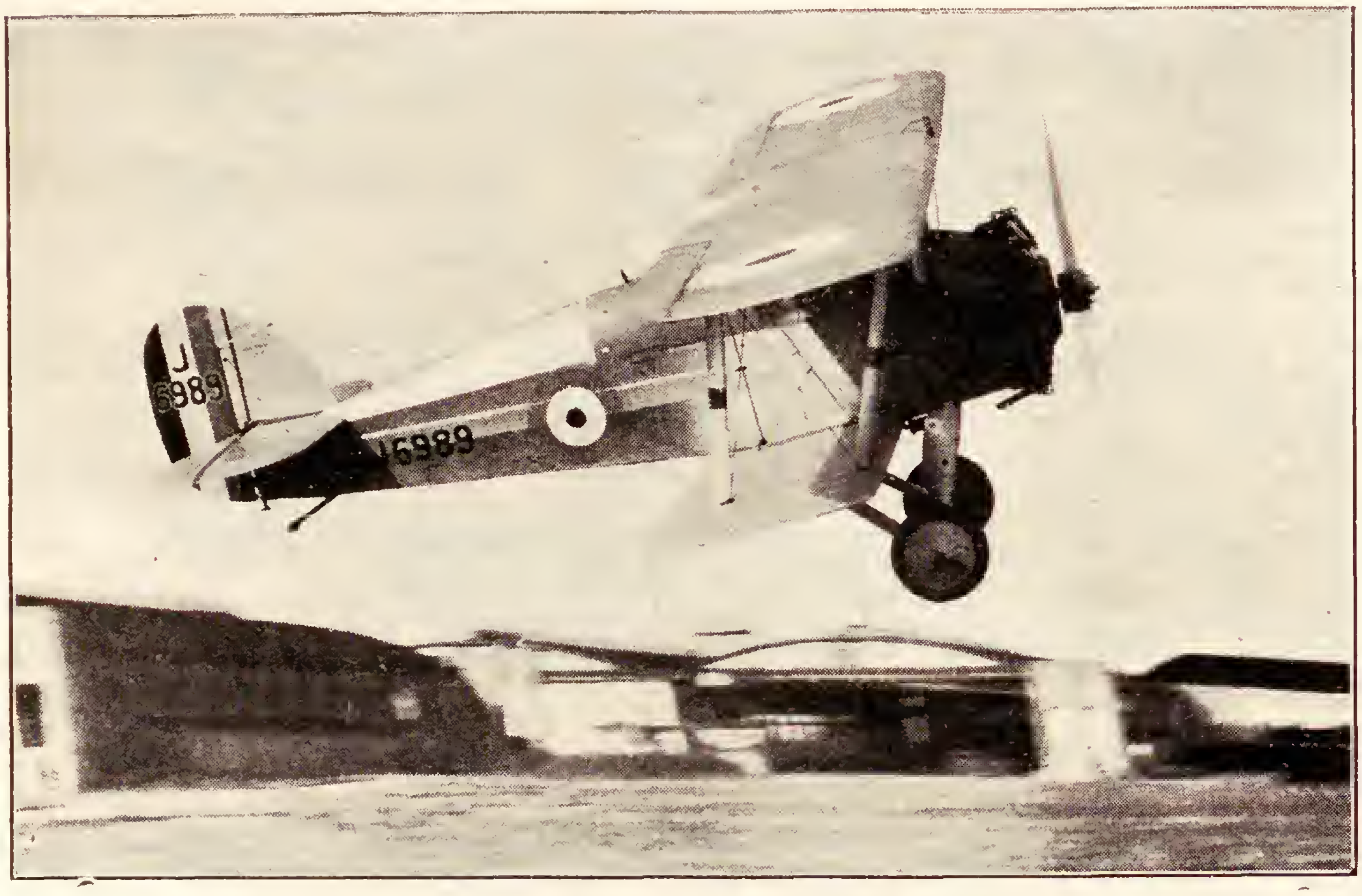

THE "HERON" S.S. FIGHTER WITH "JUPITER" ENGINE. [FLIGHT *photographs*

THE H. G. HAWKER ENGINEERING Co. LTD.

CONTRACTORS TO H.M. AIR MINISTRY
——AND FOREIGN GOVERNMENTS.——

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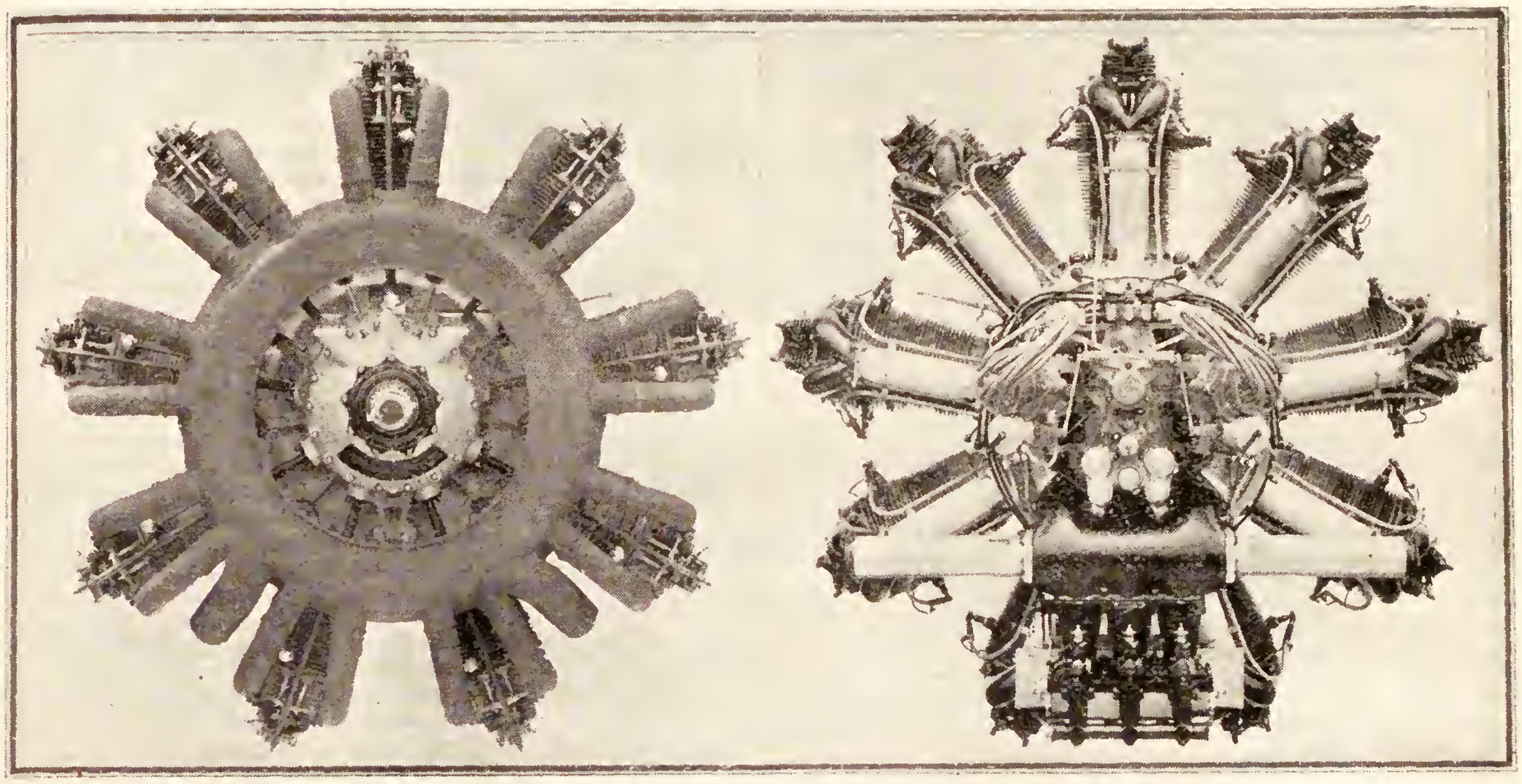
BRISTOL "JUPITER" ENDURANCE TEST

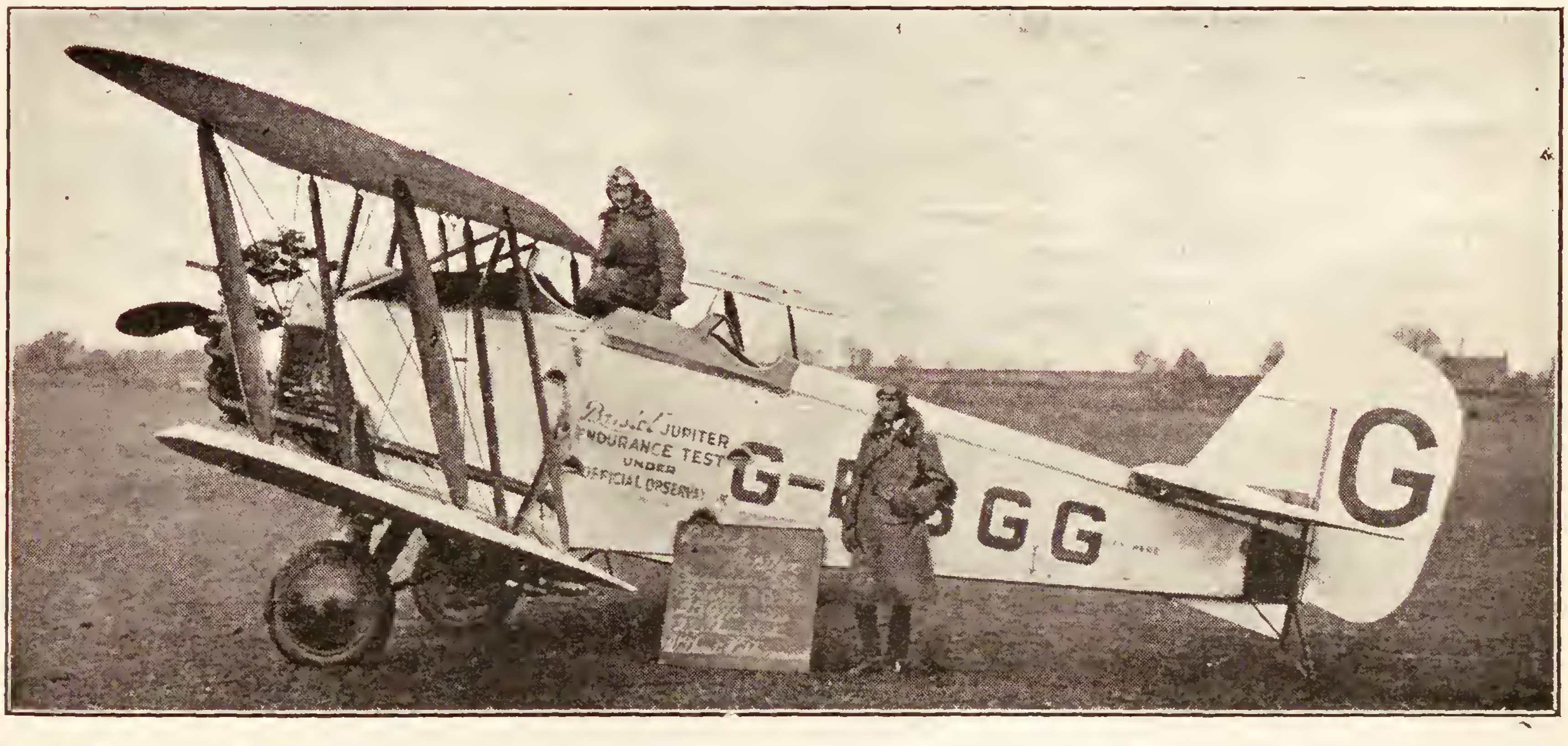
225 Hours 54 Minutes Flown and 25,074 Miles Covered Without a Replacement

As briefly recorded in Flight last week, the new series Bristol "Jupiter" completed, and in fact exceeded, the test of flying 25,000 miles without any part of the engine being replaced. The performance is one which has probably never been equalled in this or any other country, and is a most convincing demonstration of the durability of the Bristol "Jupiter" aero engine. It is somewhat unfortunate that this particular engine is of a type which is still on the "part publication" list of the Air Ministry, and consequently it is not possible to give a detailed description of it, nor to publish other than external views of the engine. It may be said, however, that the new engine has been reduced in frontal area by 12 per cent. as compared with the Series V, while the weight has been reduced by 80 lb. There is an increase of 50 b.h.p. at normal revolutions, and a similar increase in brake horse-power at maximum revolutions. To anyone familiar with aero-engine development these figures are really remarkable, and show the great advance made in air-cooled engine development of recent years.

The new series Bristol "Jupiter," which has now been in



225 HOURS WITHOUT A REPLACEMENT : These two photographs show, in front and rear view, the Bristol "Jupiter," which has recently completed what must be a record run under such conditions. Note the special exhaust ring on the front of the engine. This has been produced by the Bristol company after considerable experimentation, and has been found to give excellent results. In the rear view may be seen the new carburettor unit recently developed by the makers of the engine.



AFTER 25,074 MILES : The Bristol "Bloodhound" in which the "Jupiter" was installed for the endurance tests. This machine, although some three years old, is still going strong, and it is interesting to record that it is the prototype of the latest "Bloodhounds."

production for six months or so, passed its official type tests in the autumn of 1925 under the new Air Ministry schedule.

BRISTOL "JUPITER" ENDURANCE TESTS
Condition of major Components after Tests

Component.	Average Wear. (in.).
Cylinder bore	Nil
Piston	0·0006
Gudgeon pin diameter	0·0008
Small end bush bore	Nil
Wrist pin diameter	0·0003
Wrist pin bush bore	Nil
Crankpin diameter	0·0002
Big end bush bore	0·001
Big end bush, outside diameter	0·0007
Master rod liner bore	Nil
Cam sleeve bush bore	0·0005
Crankshaft sleeve	Nil
Eccentric gear bore	Nil
Eccentric floating bush, outside diameter	0·0005
,, ,, ,, bore	Nil
Eccentric outside diameter	Nil
Crankshaft tail bearing	0·0008

The general condition of the engine was excellent, and as shown in above table, the amount of wear was in no case sufficient to require replacements.

The latest endurance test is one more demonstration of the reliability of this type of engine, and it is worth recalling that the Bristol Company had so much confidence in this engine that they decided to put it to a very severe test. A standard production engine was taken from stock after test, sealed up, and installed in a Bristol "Bloodhound," a two-seater fighter with an all-up weight of 3,650 lb. The engine was sealed by the A.I.D., and was under their continual supervision from the time it was installed in the Bristol "Bloodhound" machine until being stripped after the completion of the test.

With the co-operation of Imperial Airways, Ltd., the Bristol Aeroplane Company obtained the services of two well-known pilots, Capt. Barnard and Col. Minchin, and the machine was flown continually between Croydon, Bristol, Birmingham, Southampton, etc.

It should be pointed out that the engine was by no means nursed during this period, but was flown hard in some extraordinarily bad weather, frequently for long periods at full throttle. During the whole of the test the engine was run at an average of about 72 per cent. of full power. The engine ran perfectly throughout, and no trouble whatsoever was experienced. At the completion of the 225 hours 54 minutes' test the engine was entirely stripped down in the presence of the A.I.D., and its condition was found to be practically perfect, the total replacements necessary being one exhaust valve and one exhaust-valve spring.

On Thursday of last week we had the privilege of examining the "Jupiter" engine at the Filton works of the Bristol Aeroplane Co., Ltd., immediately after it had been stripped down, and, although naturally we were not in a position to make actual measurements, an inspection of the engine revealed amazingly little wear, it being particularly noticeable that the most highly stressed parts, such as the big-end bearings, gudgeon-pins, etc., appeared to be in perfect condition. In point of fact, it seemed obvious that the engine could easily have completed at the very least another 100 hours' running without being touched.

In this connection one should not, we think, forget the machine in which the Jupiter engine was installed for the test. This was the original "Bloodhound" designed in 1922 and completed either that year or early in 1923. This machine has seen a great deal of service, having been employed both for experimental work and for air racing. Yet it is an excellent testimony to the quality of Bristol design and workmanship that the machine has not needed, and has therefore not been given, an overhaul since it was first built. The engine used in the 25,000 miles flight was No. J.6067 and was standard in all respects and taken from the first production batch of the new type. After the completion of the official acceptance tests, it was installed in the "Bloodhound" and handed over to the pilots of Imperial Airways, Ltd., for an impartial flight test under routine operating conditions. The whole of the test was supervised by representatives of the Air Ministry and of Imperial Airways, Ltd. At the request of the Bristol Aeroplane Company, the engine was officially sealed by the Aeronautical Inspection Directorate, so that no replacements could be made without official cognisance. Before commencing the tests it was decided that a total of 25,000 miles should be flown before the engine was dismantled, and on the successful completion of this distance the engine was removed from the machine, calibrated for power on the Froude brake, and completely stripped for official inspection. Following is a synopsis of the test: The test was commenced on January 4, 1926, and completed on March 8, 1926, having by then run for 225 hours 54 minutes, and the machine having covered a total mileage of 25,074. The average fuel consumption during the test was 21·9 gallons per hour, and the oil consumption 3·95 pints per hour. The normal power developed by the engine before test was 452 b.h.p., and the normal power developed after test was 440 b.h.p. Replacements to the engine during test were nil, and the general condition of the engine on stripping was excellent. It was considered that a top overhaul with the replacement of one valve and one valve spring was all that would be necessary to make the engine fit for a return to service.

Following is the official A.I.D. report on the Bristol "Jupiter" flight endurance test, January 4 to March 8:—

"A standard 'Jupiter' engine No. J.6067 in Bristol 'Bloodhound' machine G-EBGG completed observed flight trials of 225 hours total endurance, with the A.I.D. seals unbroken and with no replacements.

"Average fuel consumption .. 21·9 gallons per hour.

"Average oil consumption .. 3·95 pints per hour.

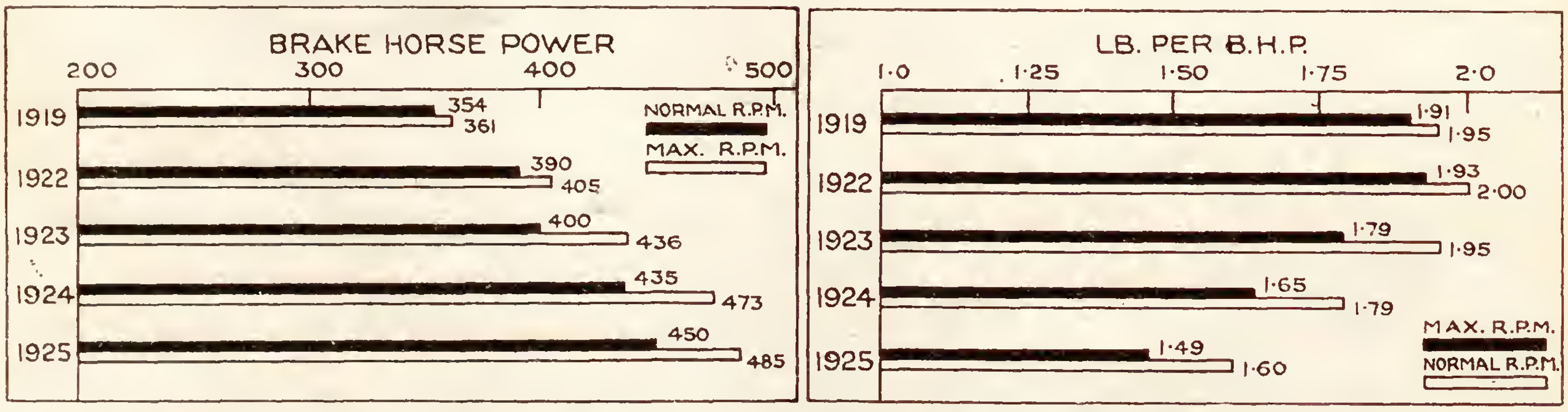
"On removal from the aircraft the engine was transferred without adjustment to the Heenan and Froude brake and run for five minutes at full throttle and normal r.p.m., developing 440 b.h.p. Power when similarly tested prior to the flight trials was 452 b.h.p.

"On dismantlement the following parts are found to require replacement to render the engine again completely serviceable:—

"One exhaust valve (stretched).

"One inner valve spring (broken in first coil).

"The condition of the engine on strip examination is excellent."



DEVELOPMENT OF THE BRISTOL "JUPITER" ENGINES: **On the left a graph illustrating the increase in brake horse power, at normal speed and at full speed, from 1919 to 1925, the power at maximum speed having risen from 361 b.h.p. to 485 b.h.p. The chart on the right illustrates the decrease in power-weight ratio during the same period, this ratio having dropped from 1·91 lbs./h.p. to 1·49 lbs./h.p. on a basis of maximum speed, and from 1·95 to 1·6 on normal r.p.m.**

LONDON - CAPE TOWN - LONDON

Another Triumph for SMITH'S EQUIPMENT in 16,000 miles flight.

Mr. Alan J. COBHAM wires :—

> *"I want to tell you that on the London-Cape Town Flight and back instrument trouble was non-existent. Many thanks to Smith's excellent instruments."*
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> *"We used K.L.G. Plugs on our Flight London-Cape Town and back, because we felt they were the only Plugs that could do the job. We have not had the slightest Plug trouble on the journey."*

Illustrations show the Smith Instruments as fitted to Mr. Alan J. Cobham's "D.H. 50 Jaguar."

Air Speed Indicator.

Oil Pressure Gauge.

Revolution Indicator.

Oil Thermometer.

Altimeter.

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8-Day Aviation Watch.

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F.15 K.L.G. Aviation Plug.

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Mr. ALAN COBHAM'S MESSAGE:—

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Alan Cobham.

Palmer Cord Aeroplane Tyres and Palmer Landing Wheels are manufactured in a range of twenty sizes, from 375 X 55 to 1750 X 300, covering the requirements of every type of machine.

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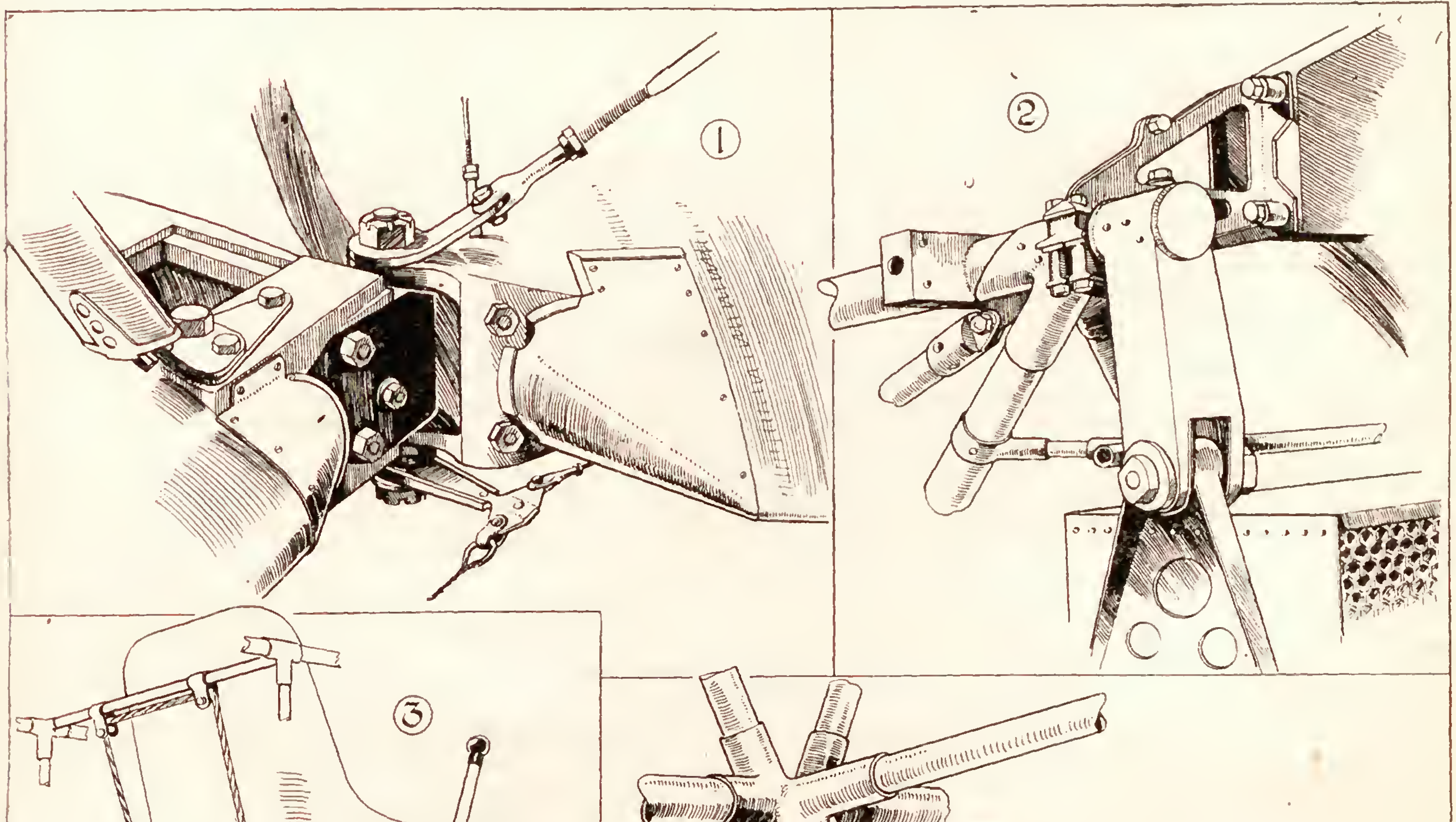
(353)

THE VICKERS "VENDACE"

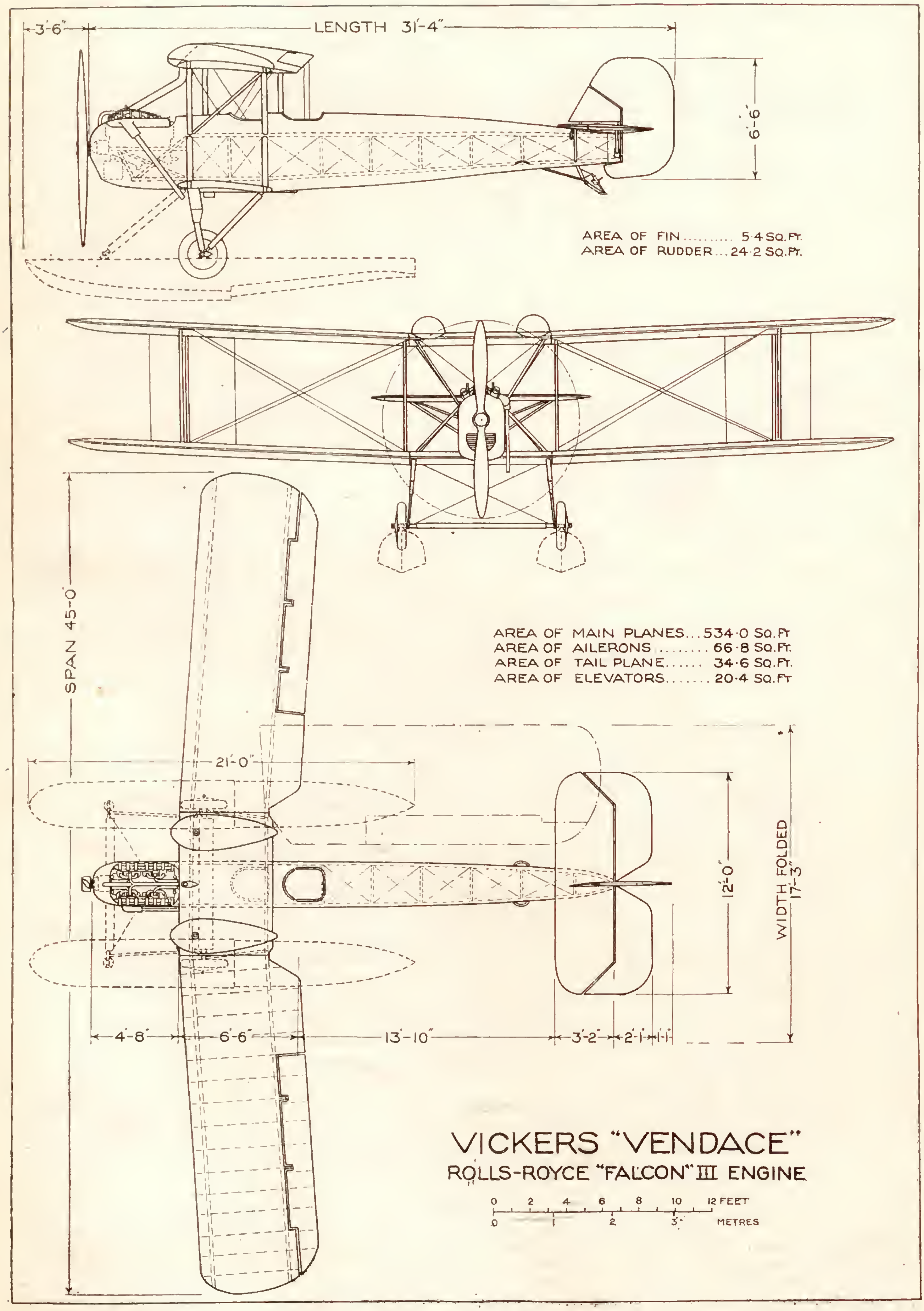
An Efficient Land or Sea Training Biplane

One of the latest products of the famous House of Vickers is a medium-sized tractor biplane, known as the "Vendace" and intended for training purposes, either as a land machine or a seaplane. It has only just been completed and probably by the time these lines appear in print it will have made its first trial flights at Brooklands—hence, we are unable this week to publish photographs of the complete machine, but the accompanying general arrangement drawings and detail sketches will, we hope, suffice for the time being to give a general idea of its features.

The "Vendace" it should be mentioned is in every way a thoroughly straightforward job following orthodox Vickers' practice, and no attempt has been made to produce anything of a startling or novel character—the one aim of its designers being to turn out a serviceable and efficient machine for the purpose for which it is intended. That their object will be



THE VICKERS "VENDACE" TRAINING BIPLANE: Some constructional details. 1. This sketch shows the lower rear wing-hinge fitting—the wing being folded half-way back—and the crank, mounted on the hinge bolt, through which the ailerons are actuated, thereby enabling the wings to be folded back without upsetting the aileron adjustment. Note the neat metal fairings on the plane edges. 2. The forward end of one of the engine bearers, showing the front engine bracket and the suspension of radiator. 3. The adjustable seat, shown in normal position, and 4, in raised position. Adjustment is effected by means of the hand lever through an Auto-Lock (friction) device. 5. The Oleo tail-skid with 6, a diagram of the complete unit.


3'-6"
LENGTH 31'-4"
6'-6"
AREA OF FIN.......... 5·4 SQ.FT.
AREA OF RUDDER... 24·2 SQ.FT.
SPAN 45-0"
AREA OF MAIN PLANES... 534·0 SQ.FT
AREA OF AILERONS .... 66·8 SQ.FT.
AREA OF TAIL PLANE...... 34·6 SQ.FT.
AREA OF ELEVATORS....... 20·4 SQ.FT
21'-0"
12'-0"
WIDTH FOLDED 17'-3"
4'-8"
6'-6"
13'-10"
3'-2"
2'-1"
1'-1"
VICKERS "VENDACE"
ROLLS-ROYCE "FALCON" III ENGINE
0 2 4 6 8 10 12 FEET
0 1 2 3 METRES

THE VICKERS "VENDACE" TRAINING BI-PLANE: General arrangement drawings, to scale. This machine can be used as either a land- or seaplane.

"The only Plugs that could do the job"

says Cobham.

Mr. Alan J. Cobham wires us as follows:—

> "We used K.L.G. Plugs on our flight from London to Cape Town and back, because we felt they were the only plugs that could do the job.
>
> "We had not the slightest plug trouble on the whole journey."

"Fit and Forget"

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WAKEFIELD
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MOTOR OIL

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Mr. Cobham cabled from Cape Town:—
"CONGRATULATIONS ON YOUR WONDERFUL CASTROL R OIL WHICH HAS LUBRICATED MY AIR-COOLED SIDDELEY ENGINE SO SUCCESSFULLY ON OUR FLIGHT FROM LONDON, THROUGH TROPICAL AFRICA TO CAPETOWN.
ALAN COBHAM."

There is a Castrol Grade for every engine. Write for our Pocket Lubrication Index, which indicates the grade recommended and gives prices.

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Mr. Alan Cobham says:—

"ACCEPT MY APPRECIATION OF YOUR TWO MAGNETOS WHICH HAVE RUN WITHOUT THE SLIGHTEST FAULT IN LONDON - CAPETOWN FLIGHT." ——— *they were*

B T·H **Magnetos**

Operating at 2,700 r.p.m. and giving 10,850 sparks per minute—continuously and in regular sequence—throughout the 16,040 miles' flight, B.T.H. magnetos have added another notable achievement to the long list of records which has made them.

Ideal for the Road. Unexcelled in the Air.

THE BRITISH THOMSON-HOUSTON CO., LTD.,
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Alma Street, - - - - Coventry.
WORKS:—Rugby, Birmingham, Willesden, Coventry, Chesterfield.

achieved is, we think, apparent merely from a glance over the general arrangement drawings, for it must be admitted that the general lines of the "Vendace" are at once pleasing, clean and business-like.

There are, however, one or two features in the design of the "Vendace" which call for special mention. One of these is an effective method of adjusting the height of the seats (to suit out-sizes of occupants) during flight, another, the neat housing and mounting of the power plant, and also the fact that to change the machine from a land 'plane into a seaplane it is only necessary to remove the wheels and substitute floats on the same chassis with only two additional struts. We will refer again to these points later on in our description.

As previously stated the "Vendace" is a tractor fuselage biplane, and the wings are of equal span and chord, of moderately thick wing-section. Both upper and lower planes are set at a dihedral angle and are given a sweep-back of about 3°. They comprise three main sections—upper and lower centre panels and the corresponding outer extensions. The centre panels are only slightly wider than the fuselage, and carry the main wing extensions by means of the standard Vickers' hinge-fittings so that both right and left-hand wing cellule can fold back alongside the fuselage—the pivot point being on the rear spar. This process of folding, as on all Vickers' machines employing this feature, is very simply and quickly carried out—merely by unscrewing the two upper and the two lower bolts on the front spar attachments to the centre panels. The lower centre section, by the way, is carried by four bolts on extension brackets below the bottom longerons of the fuselage, and can easily and quickly be removed from the fuselage.

The wing construction follows usual Vickers' practice, viz.: spruce and ply-box section main spars, and built up spruce ribs. Compression members are spruce segmented tubes and the internal wing bracing is by swaged steel tie-rods. Each outer wing cellule has a single pair of streamline steel tube interplane struts, and one front strut at the hinging line; the centre sections are braced by streamline steel struts, sloping out from the top longerons of the fuselage up to the top, and down to the bottom, centre section spars respectively. Thus the external wing bracing is to all intents and purposes of the single bay type; bracing between struts is carried out by streamline steel tie-rods.

The control surfaces are of similar construction to that employed for the main planes; in the case of the fin and rudder mild steel and Duralumin tube, with built-up spruce ribs, are employed. Ailerons are fitted to both top and bottom planes, they are of the balanced type, *i.e.*, they are pivoted on their front spars from projections on the rear wing spar, so that the portion of the aileron from spar to leading edge forms the balance, the main planes being cut away from rear spar to trailing edge to receive the complete ailerons.

Elevators and rudder are balanced, while the fin is adjusted to counteract the slipstream effect from the airscrew, and the horizontal stabilizer is adjustable as to incidence during flight, being operated by a wheel on the right-hand side of the pilot's cockpit. Dual controls of the stick and rudder bar type are provided, and the aileron controls are so arranged that the folding back of the wings will not upset their adjustment. An oleo tail skid is provided.

The fuselage is of the orthodox Vickers tubular-cum-wire bracing rectangular girder construction, the longerons and struts being of mild steel tube and the bracing of swaged steel tie-rods. From the sternpost to the engine section there are nine bays, then comes an extension of the fuselage forming a simple but effective engine mounting employing the same materials. The engine, a Rolls-Royce "Falcon III," is most "get-at-able," and its removal is quite a simple process. A deep semi-circular radiator is slung beneath the engine bearers, at the forward ends; an extremely neat metal cowling completely encloses the engine and radiator, an opening being formed for the latter where an efficient shutter arrangement is provided. A rubber packing piece is placed between the radiator edges and the metal cowling so that all air passes directly through the radiator.

Fabric is employed for the covering of the fuselage and a very neat turtle-deck fairing is provided for the top and bottom. This fairing consists of built-up wood girder arches mounted across the longerons at each bulkhead which carry longitudinal stringers.

The two cockpits are placed fairly close together and are provided with plywood fairings. As previously stated the seats can be adjusted during flight, a feature, we think, that possesses considerable advantages, not only in a training machine where a variety of pilots have to be suited, but for general purposes also. For instance, in the case of a long-distance flight, when taking off, landing, or looking for landmarks, the pilot can instantly raise himself well up in the cockpit, then, when he wishes to cruise in comfort he can lower himself down again. The operation of raising and lowering the seat is very simply carried out by means of a parallel-link motion actuated through a special auto-lock device by a lever at the side of the seat. However heavy the pilot may be the friction of the auto-lock is sufficient to retain the seat in any position it may be put. The arrangement is shown in one of the accompanying sketches.

Gravity system petrol supply is employed, petrol being carried in two large tanks mounted in the top centre section. An oil tank, with radiator, is mounted in the floor of the front cockpit. The tanks are of tinned sheet steel and pipe couplings are of the metal to metal type.

The landing chassis is of the axle and V-strut type of comparatively wide track—8 ft.—with standard Palmer wheels. An improved and very compact Vickers oleo-pneumatic shock absorber is embodied in the front members of the V, which are of streamline steel tube braced with swaged steel tie-rods. To convert the machine into a seaplane, the wheels are removed and two long Duralumin floats attached to the axle in their place, while an additional strut is fitted extending forward from each top fitting of the forward V strut (a lug being provided for this purpose) down to the floats. These struts are also braced by swaged steel tie-rods. Except for the fitting of the floats, the machine as a seaplane is otherwise identical to the land type.

In conclusion it should be mentioned that all bearings or moving joints throughout the "Vendace" are provided with pressure grease lubricators, a small but none-the-less important feature.

The principal characteristics of the Vickers "Vendace" are :—

Span	45 ft.
Overall length	31 ft. 4 in.
Overall height	12 ft. 9 in.
Overall width (folded)	17 ft.
Chord	6 ft. 6 in.
Area of main planes	534 sq. ft.
Weight light (with water)	2,585 lb.
Useful load	890.
Weight laden	3,475 lb.
Loading per sq. ft.	6·5 lb.
Loading per h.p. (290 at 2,200 r.p.m.) ..	12 lb.
Speed range	44-117 m.p.h.
Climb to 5,000 ft.	5 mins.
Service ceiling	20,500 ft.
As seaplane—	
Overall length	35 ft. 2 in.
Overall height	14 ft. 1 in.
Weight light	2,960 lb.
Weight laden	3,850 lb.
Loading per sq. ft.	7·2 lbs.
Loading per h.p.	13·3 lb.
Speed range	45·5-111 m.p.h.
Climb to 5,000 ft.	6·5 mins.
Service ceiling	17,000 ft.

◆ ◆

London Anti-Aircraft Units

H.M. the King has approved of the 156th (London) Anti-Aircraft Battery, Royal Artillery (Territorial Army), being in future designated the "156th (Barking) Anti-Aircraft Battery, Royal Artillery (Territorial Army)."

The Polar Flights

Preparations for flights to the North Pole this spring are nearing completion in both the Amundsen and the Wilkins expeditions. As previously reported, Amundsen's Italian airship "Norge 1" has already made successful trials, including a night flight from Rome to Civitavecchia and Capri and back, lasting about eight hours. The Fokker machines, which Capt. Wilkins will use for his dash north, have been erected at Fairbanks (Alaska). Unfortunately, when one of the machines was about to make a trial flight, Mr. Hutchison, one of the members of the expedition, stepped back into the air-screw zone just as the engine started, and was fatally injured.

U.S. Airship Crash

The U.S. Army airship TA-5 dived into the sea at Hampton Roads whilst carrying out a flight on March 10. Another airship and a Government cutter at once rushed to the rescue, and the crew were taken off by the cutter, which also towed the damaged airship to Fort Monroe.

AIR DEBATE IN THE HOUSE OF LORDS

FOLLOWING are extracts from *The Times* report of the air debate in the House of Lords on March 10 :—

Lord Thomson (who was Secretary of State for Air in the Labour Government), in calling attention to the air policy of his Majesty's Government and moving for papers, expressed the view that the Government had, in the light of Locarno, acted rightly in slowing down the scheme of expansion which was initiated in 1923. He believed that this gesture would be noted and appreciated throughout the world, and he trusted that their example would be followed and result in a nearer approach to a more general reduction in armaments throughout Europe. If people only knew what was in store for them in the event of another European war there would be no war talk or jingoes outside the lunatic asylums. He regretted that it had not been possible to do more in the way of allocating funds to research and to commercial aviation. They could no more reduce their expenditure on the Air Force than they could on education. He regarded aviation as a branch of national and Imperial education. They had to teach the British people the habit of the air, so that the Empire could be linked up by means of this new and rapid form of locomotion. Expenditure on research was, in his view, a sound investment ; thereby economies might be effected later, and flying could be rendered safer and, therefore, more popular. Encouragement should be given to this department of the Air Ministry, and men of science should be able to count on a career if they devoted themselves to aeronautical research. If he were to pass a criticism on the admirable body of men who composed the staff of the Air Ministry, he would say that they were not so enthusiastic as they might be in regard to research, because they could not be too enthusiastic. Aviation was still in its infancy, and, great as were the achievements of the past, they would pale in significance compared with what would happen when the best scientific brains of the country devoted themselves to the conquest of the air. As regarded commercial aviation, its development was essential to the nation and the Empire. A great deal of education in this matter was required. It was an extraordinary feature of the times they lived in that English-speaking people, in spite of the many inducements to do so, did not appear to grasp the full significance of this means of transportation. A very different state of affairs existed in Germany, where, in spite of the restrictions on civilian construction by the Treaty of Versailles, the commercial aviation industry displayed an astonishing vitality. He applauded the decision of the Government not to re-open the question of a separate air arm and Air Ministry. But he failed to understand the need for secrecy in regard to the Colwyn Committee's Report. It was surely unjust to allow the Air Ministry to be accused of extravagance and inefficiency—charges which had not yet been proved to be founded—and that no defence should be put up in order that the feelings of the older Services should not be hurt. The country surely had a right to know what was the verdict of the Colwyn Committee. If there were reasons why the Government could not publish the Report in full—and he could imagine several—he pressed for answers to certain questions. Apparently, the Colwyn Report stated that no economy could be effected if the Air Force and the Air Ministry were abolished as separate entities. So far so good. But a little more light was needed on the subject. They had to remember the recklessness with which accusations had been made in public against the Air Minister. That rather official observation would not go far to console the *personnel* of the Air Force. It was a negative reply. Something much more definite was wanted. He would ask whether an investigation was made of the proposal that air co-operation should be provided in the future by separate naval and military wings, and, if so, with what result. Did the Colwyn Committee recommend that the Navy and Army should have increased powers of control over those portions of the Air Force which existed primarily for co-operation with the other Services, or did the Colwyn Report say exactly the reverse ? In the interests of justice, as well as of efficiency and economy, the country had a right to know what, in general terms, were the findings of the Committee, about whose report there had been a flood of rumours which were damaging to the Air Force.

He recalled that the dual system now recommended in certain quarters had not stood the only test worth considering —the test of war. Before the war the dual system had caused constant friction, waste and confusion, and in 1917 it became evident that Great Britain was not holding its own in the air on the Western Front. A unified Air Force was then created, and when the Armistice was signed Great Britain had taken the lead in the air over all other belligerents. Experience had shown that the Air Force could no more be placed under a sailor or a soldier than the Army could be placed under an admiral or the Navy under a general. In the event of another European war our ports and industrial and military centres would be exposed to complete destruction before the Army could be mobilised or the Fleet could put to sea, and against such attacks the Air Force was the sole line of defence. It was not auxiliary to other Services ; rather other Services were auxiliaries to the Air Force.

To him this was not a question of politics in the party sense ; it was one of national policy. It might be that he had been flogging a dead horse—he hoped he had. But there were powerful influences behind these attacks on the Air Ministry and the Air Force. They were ceaseless in their activity, and, in his opinion, highly dangerous. Their aim was the subordination of the Air Force to one or other of the older Services, or, worse still, to both. That meant placing the control of a very technical weapon in the hands of men who did not understand its functions. The question of a Ministry of Defence had been dragged into the controversy, but in his view that was entirely irrelevant on the Air Force Estimates. It had, as he understood the matter, no connection whatever with these estimates, or, at any rate, a very remote connection. The most relevant questions were those he had ventured to put in regard to the Colwyn Report, and the reactions of that report on air policy. It was because he considered these questions so important, and because he felt very deeply on the subject that he had raised them that afternoon.

The Duke of Sutherland, Paymaster-General, replying on behalf of the Government, welcomed Lord Thomson's speech, and said they were glad to have his valuable advice and counsel in these matters. Three sets of criticisms were disclosed in the recent debates in another place on the Air Force Estimates. The first set was made by those who wished to scrap the Air Force entirely as a step towards general disarmament ; the second came from those who wished to increase the Air Force even more quickly than was being done under the present arrangement ; and the third from those who, while agreeing in the main with the present expenditure on the Air Force, considered that the money was not being spent to the best advantage. He was glad that Lord Thomson did not support any of these criticisms, but that, on the contrary, with a few modifications, he supported generally the present policy of the Air Ministry—a policy with which he had so much to do in building up only a short time ago.

In spite of what the various critics said, there was no doubt that the Air Force to-day had as good a chance of being well administered as any other Service. It was run by men who had ample experience in the development of this new arm, and who knew, as well as they could be known, the possibilities and difficulties of the situation. They were a picked body of men, with expert and first-hand knowledge. Suppose the critics were right ? It would, indeed, be difficult to know what policy to follow, because they contradicted one another even more violently than they disagreed with the policy of the Air Ministry. There was no need to fear that the Air Force would be starved. The policy of the Air Ministry was to hold the balance between the new feeling of peace produced by the Locarno Pact and the need for a strong Air Force. That policy could be varied, altered, or modified each year in accordance with the position of affairs in Europe without vitally affecting the gradual but necessary growth of the Air Force as a whole. The Air Force had always been terribly underhoused, and the present expenses were caused to a very great extent by the necessary housing of a new force.

As regarded the Colwyn Report, all he could say at present was that the report was a Cabinet document, and, therefore, could not be published. But he could tell Lord Thomson a good deal more than had already been made public. In general terms he might say that the Colwyn Committee recommended the continuance of a single unified Air Service to carry out all air work, whether for the Navy, Army, or central Air Force. They went on to say that they favoured a strengthening, rather than a weakening, of Air Ministry control over those portions of the Air Force which co-operated with the Navy and Army respectively. The noble lord had said that he would like to see research so arranged that experts could go into the research department of the Air Ministry and make a life's work of it. If it were possible, it would be a splendid idea, and he would put the matter to the Air Minister at the first opportunity. A good deal had been done by the

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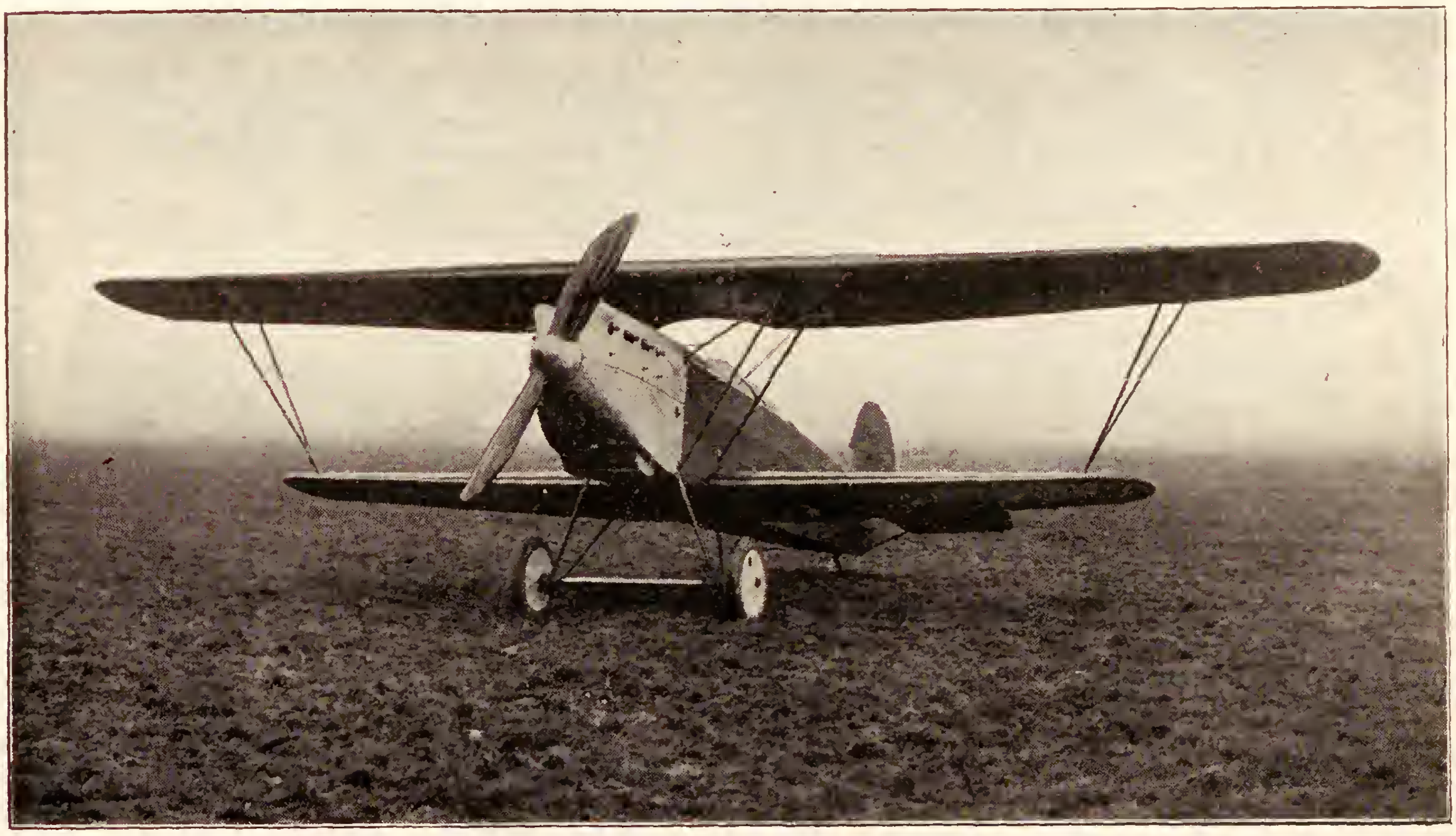

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Air Ministry in the last year or two in regard to research. They were spending a good deal more this year than they did in 1925-26. Though hampered by lack of funds, they had been able to reorganize their technical organization, and they had constituted a separate director of scientific research with a small staff to ensure that all the purely scientific aspects of the problem of aviation should receive the fullest consideration under the most favourable conditions. They were endeavouring to make a fuller use of outside scientific resources. They had recently formed at Oxford and Cambridge two air squadrons, which would serve to maintain closer touch between the Air Force and the Air Ministry on the one hand, and the scientists and Universities on the other.

By this means they hoped to be able to enlist the assistance of the unrivalled scientific talent in the Universities in solving the difficult problems of aeronautical research. In regard to civil aviation, the subsidies would undoubtedly increase from year to year. The figure this year was £105,000 higher than that for 1925-26, and the provision of subsidies would have been materially larger had there been a full year's provision for the subsidy of £93,600 annual maximum, which it is was proposed to pay for the operation of a regular fortnightly service between Karachi and Cairo. This new service, which would be in operation at the end of the current calendar year, provided a most important link in Imperial communications. It was essential to us to see that it was organized on the most favourable basis, with first-class technical equipment. Imperial Airways, who were to operate the service, were purchasing a number of three-engined machines of the most up-to-date type. A sum of £362,000 was provided under other heads for airship development. Expenditure on airships was undoubtedly of greater value for commercial purposes and speeding up communications than for military purposes.

Lord Thomson then withdrew his motion.

IN PARLIAMENT

Aircraft Construction in Dockyards

Mr. Hore-Belisha, on March 10, asked the First Lord of the Admiralty whether the Admiralty have turned their attention to a necessity that may arise in the near future of constructing aircraft in the Royal Dockyards; and whether the technical officials of the Admiralty have examined the problems involved?

Mr. Davidson: The answer to both parts of the question is in the affirmative, but I understand that it is the present policy of the Air Ministry to rely upon the aircraft industry for construction.

Aircraft and Anti-Aircraft Units Combined Exercise

Mr. Thurtle asked the Secretary of State for Air whether, before deciding to carry out a sham air attack on London he will take into consideration the disturbing effect such an attack would have upon the nerves of the people, especially those who experienced air raids during the War?

Sir S. Hoare: Assuming that the hon. Member is referring to the proposed combined exercise to be carried out next May by aircraft and anti-aircraft units, I am glad to say that the arrangements will be such as to occasion no alarm to the population. There is to be no organised sham air attack, but a few machines will fly over London to afford practice to anti-aircraft and searchlight units. There will be no firing.

Aircraft Sales Abroad

Mr. Rennie Smith asked the Secretary of State for Air if he can give particulars of the sales abroad by British aircraft industries year by year since 1920; to which countries the goods are destined, and whether private firms or Governments; and what increase in foreign trade may be expected as a result of the concessions in selling which it is this year proposed to introduce?

Sir S. Hoare: As regards the first part of the question the hon. Member will find particulars of the exports of aircraft, engines, and parts, for 1920 and the four subsequent years, in the Annual Statement of Trade for the United Kingdom, 1924, volume 3, page 469. I understand that particulars for 1925 will be published in due course. As regard the second part, the published figures indicate the countries of destination, but not whether the purchasers were private firms or Governments. I am afraid I have no information to enable me to reply to the last part of the question, but there is little doubt I think, that the proposed withdrawal of certain restrictions on the sale abroad of the later types of machines should result in an improvement in this trade.

Airship Construction

Commander Bellairs, on March 11, asked the Prime Minister whether the Committee of Imperial Defence, in pursuance of combined action between the three fighting Services, have formed any conclusion that airships will be largely used for naval reconnaissance, as put forward in all the suggestions as to their utility; whether all previous airships have been built under the supervision of the Admiralty; and whether the Admiralty have been fully consulted as to the designs of the two airships?

The Prime Minister: The answer to the first part of the question is in the affirmative, and to the second in the negative. The answer to the third part is also in the negative, the aim of the Air Ministry being to produce airships to meet the requirements of all three services, *e.g.*, as aircraft carriers and for the conveyance of troops, as well as for naval purposes. I may add that responsibility for the design and construction of airships was transferred from the Admiralty to the Air Ministry in 1919-20, together with a portion of the staff hitherto employed on this work by the Admiralty.

Commander Bellairs: With reference to the second part of my question, as to whether all previous airships have been built under the supervision of the Admiralty, may I ask the Prime Minister if he can tell me of any airship that has not been built under the supervision of the Admiralty?

The Prime Minister: Oh, yes; all the airships that were built by the Army.

Commander Bellairs: Am I to understand, therefore, that the Air Department has no experience in building airships, and that the Department which has experience is not to be consulted?

Air Mails Committee

Viscount Sandon asked the Secretary of State for Air whether since its Interim Report in 1924 any final Report has been published of the Air Mails Committee, under the chairmanship of the Parliamentary Secretary to the Ministry of Transport; and, if not, when it is to be expected?

Major Sir Philip Sassoon: The answer to the first part of the question is in the negative. As regards the second part, I am not in a position to state when sufficient material will have been collected to warrant the issue of a further Report.

LIGHT 'PLANE CLUB DOINGS

London Aeroplane Club

The flying time for the week ending 14th inst. was 17 hours 30 minutes. The following Members had dual instruction:—L. G. Anderson, J. Barros, Sir John Rhodes, E. D. Moss, R. P. Cooper, E. K. Blyth, S. O. Bradshaw, Mrs. Eliott-Lynn, K. Kennedy, R. Malcolm, G. W. H. Wallcousins, J. S. M. Michie, T. H. O. Richardson.

The following Members made solo flights:—N. Jones, Mrs. Eliott-Lynn, G. N. Warwick, Squad-Leader M. E. A. Wright.

The Club machine piloted by Capt. F. G. M. Sparks formed one of the escort which met A. J. Cobham on his return from South Africa on Saturday.

P. G. Lucas and W. E. P. Johnson have been given commissions in the Royal Air Force and G. N. Warwick has been given a commission in the Royal Air Force Reserve. David Kittell, who has recently taken delivery of his D.H. "Moth," has already put up over 14 hours flying.

The subscriptions towards the purchase of the third D.H. "Moth" are coming in very satisfactorily. Subscriptions already published, £555. Since received.—Capt. G. de Havilland, £50; V. H. Doree, £20; O. H. H. Pollard, £10; R. P. Cooper, £5; S. C. Richards, £5; Commandant Allen, £3; Miss Tagart, £3; R. Malcolm, £3; L. C. J. Mitchell, £3; A. Southgate, £3; L. G. Anderson, £2; E. K. Blyth, £2; A. Lees, £2; H. R. Thomas, £2; C. E. Murrell, £2; W. E. D. Johnson, £2; J. Barros, £1; E. D. Moss, £1; R. L. Preston, £1; G. H. Wallcousins, £1; Capt. Lamplough, £1; Miss O'Brien, £1. Total to-date, £678.

The Lancashire Aero Club

The weather has been exceptionally bad, a gale preventing any flying except on Saturday and Sunday.

On Wednesday the small hangar was blown down and completely wrecked. Fortunately, the three "Moths" had been removed a short time before, and so escaped, but the L. P. W. lies among the fallen girders.

Instruction by Mr. Stack:—C. Barnes, 1 hr. 5 mins.; C. Parker, 55 mins.; J. Leeming, 1 hr. 5 mins.; A. Macnair, 40 mins.; C. Agar, 25 mins.; P. Michelson, 40 mins.; F. Gattrell, 30 mins.; W. Colley, 50 mins.; A. Slater 40 mins.; C. Brown, 30 mins.; R. Williams, 20 mins.; D. Dyson, 10 mins. A. Goodier, 25 mins.

Instruction by Mr. Cantrill: A. Goodier, 30 mins.

Instruction by Mr. Scholes: A. Macnair, 25 mins.; W. Harden, 25 mins.; F. Davison, 30 mins.; C. Agar, 20 mins.

Solo flights by M. Lacayo, 1 hr. 15 mins.; A. Goodfellow, 20 mins. Tests occupied, 25 mins. Joy rides: Miss Betty Chester, 15 mins.; Miss Barbara, 10 mins.; Mr. B. Smith, 15 mins.

Total dual, 10 hrs. 45 mins. Total solo, 1 hr. 55 mins. Tests, 25 mins. Joy rides, 40 mins. Total time flown, 13 hrs. 25 mins.

A new Avro bi-plane will be presented to the Club by Sir William Letts on April 16.

The Newcastle-upon-Tyne Aero Club

Report for week ending March 14.—The gale which has been experienced for over a fortnight continued during the week, until Saturday, when it abated a little. Previous to that all the flying which had been possible was one hour on Wednesday evening and 35 minutes on Friday. Sunday brought much better weather, although it was very dull, and over six hours was put in on the one machine in service, G-EBLY. Total time for the week: 10 hrs. 5 mins.

Dual with Major Packman: Mrs. Marcks, Mr. Sandilands, Mr. C. Thompson, Mr. Bruce, Mr. L. Smith, Mr. W. Todd, Mr. M. G. Thirlwell, and Mr. Bainbridge. Total, 6 hrs. 10 mins.

Secondary dual, also with Major Packman: Miss Leathart and Mr. W. M. MacKay. Total, 35 mins.

"A" pilots: Mr. R. N. Thompson, Mr. W. Baxter Ellis, Mr. N. S. Todd. Total, 3 hrs. 5 mins. All, of course, flew with friends as passengers.

Mr. Ovens was the only passenger and had one 15-minute flight.

Further straight flights were carried out on Mr. Ellis's "Gull" on Sunday, but before anything further could be attempted two of the rubber shock absorbers, which are very old, broke.

Repairs to LX are well in hand and with a return of good weather conditions it is hoped that it will soon be possible to make up for all the time lost during the past two or three weeks.

CORRESPONDENCE

The Editor does not hold himself responsible for opinions expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters intended for insertion in these columns.

"DEVELOPMENT OF AIR SENSE"

[**2129**] Much has been written on the development of air sense of the nation, but until now an important educational feature appears to have been overlooked. I refer to practical model aeroplane construction and flying.

The Air Ministry realising the importance of the matter have given valuable assistance to "Light 'Plane Clubs," and by so doing have managed to secure the interest of a great many young men, who are now able to satisfy to a certain extent their practical interest in aviation and incidentally pave the way for the future generation. But what of the future generation? It appears nothing is being done to initiate them into the rudiments of aeronautics, nothing with the exception of an occasional article in FLIGHT or other technical paper, usually too far advanced for them. Recently, in London, there was held under the auspices of the Air Ministry, the school-boys' exhibition, which, I believe, was organised for the special purpose of interesting the boys from our public and elementary schools in aviation. Why was not the "Society of Model Aeronautical Engineers" invited to give a representative show of actual flying models?

Hasn't the Air Ministry and the Director of Civil Aviation heard of this Society? because if not, it is time they did. The Society was founded some years back by a keen body of pre-war model-flying enthusiasts to take up the threads of this most fascinating hobby from the point where they were dropped in August, 1914.

The Society is recognised by the Royal Aero Club as the governing body of model aeronautics in Great Britain, and they hold a great many challenge cups, including one given by FLIGHT for competition.

Surely, here is the starting point for educating the potential light 'plane club, Royal Air Force members and airway users of to-morrow.

I feel sure the Hon. Sec. of the S.M.A.E. would be only too pleased to arrange a demonstration of flying models for our sporting Director of Civil Aviation to witness. Perhaps he may be impressed enough to suggest to the Air Ministry that they offer prizes for model design, construction and flying throughout the country among schoolboys and apprentices, thereby striking at the vital points.

Model engineering has always held a great fascination for Young England, and when it is combined with an up-to-date science and introduces plenty of outdoor exercise, surely it must be worth considering. I know there are many sceptics, but I also know that in other countries interest in model aviation is very keen, as it was in this country until the outbreak of war. One has only to glance back to the old copies of FLIGHT to prove this. This brings me to another important item. From whence are the youngsters to obtain their information? Time was when one could refer an interested spectator to FLIGHT for information, but as there is no weekly model page published at the present time, it is impossible.

I am continually being asked by all classes of people, especially youths of about sixteen and seventeen years of age, where they can obtain information which will help them to build models and learn a little of the science of aeronautics in a simple and straightforward manner. I know that the interest is there and only wants stimulating.

Now then, Mr. Editor, production costs are high at the moment, I know, but if some encouragement and information is not given to these young people, who are most anxious to absorb the mysteries of this modern science, how can you expect to develop an air sense?

I am sure you will find no difficulty in getting some one to write it up weekly, and no lack of material.

I really do feel that it will do a great deal to stimulate public interest, for, on any fine day, model flying attracts large numbers of people.

I have been a keen model enthusiast and reader of FLIGHT since 1908, and was a founder member of the Blackheath Model Aero Club, which at the commencement of the war had a large membership, many of whom, including myself, as a direct outcome of model study, were able to join the Air Services, some serving with distinction.

Trusting you will find the foregoing interesting enough to publish.

CHARLES A. RIPPON

Crouch End.
March 6, 1926.

SLOTTED CONTROL AND STALLING

[**2130**] If Mr. Courtney had read my reply carefully, in your issue of March 4, where I state "that when ailerons are used above the stall the down aileron has the effect of *producing a very high value of drag, and, in consequence, reducing the speed of the wing on that side, which is the opposite effect to that desired*" and "the slot control produces a very high rolling moment and at the same time *reduces the drag on the side of the wing with the aileron down, making all motions in the direction of turn*," he would not have written "that a reduction in a positive does not necessarily make a negative."

As I state quite clearly that the drag has been reduced to a value, making it in the direction of turn. It is evident, therefore, that the sign has changed.

This statement is confirmed in the following R. and Ms., No. 856: "Some experiments on a model biplane having slotted wings, with particular reference to the improvement of lateral control at low speeds," by H. B. Irving, B.Sc., and A. S. Batson, B.Sc., No. 916 "Slot control on an Avro with Standard and Balanced Ailerons," by F. B. Bradfield, of the R.A.E.

Also in Mr. Handley Page's article in THE AIRCRAFT ENGINEER for January 28, 1926, where a vector diagram is given showing slotted control tests on a $\frac{1}{10}$ scale model biplane of rolling moment against yawing moment.

As regards sinking velocity, a few minutes spent on $V/\frac{L}{D}$ with different values of maximum Kl (not of course forgetting the slot) and various loadings for the determination of Vl would enlighten him. There was no suggestion that the machine should remain stalled.

"Pancaking" is not always associated with stalled flight. A glide can be executed at an angle approaching maximum lift coefficient, and a bump or carelessness can cause a stall. The point was that with "stalled control" the wing could be picked up when the machine was stalled in the manner stated above and the glide continued at the maximum lift angle. This resulting in a pancake landing.

Having had a fair amount of experience as a pilot and still enjoying the privilege, I get ample opportunity of studying both sides of the question: theoretical and practical.

Cricklewood, R. REYNOLDS
March 15, 1926.

* * * *

Royal Aeronautical Society

MR. ALAN J. COBHAM is giving his lecture on "Long-Distance Aeroplane Flights" before the Society this evening, at 6.30 p.m., at the Royal Society of Arts, Mr. H. T. Tizard, A.F.C., F.R.S., F.R.Ae.S., in the Chair.

Capt. G. T. R. Hill's lecture on "The Tailless Aeroplane" will be given at 6.30 p.m. on April 22 at the Royal Society of Arts, instead of on April 15, as previously announced.

R.Ae.C. Monthly House Dinner

THE next monthly house dinner will be held at the Royal Aero Club on Tuesday, March 23, 1926, at 7.15 p.m. The subject for discussion will be "The Future of Flying," and the debate will be opened by the Right Hon. Sir Samuel J. G. Hoare, Bart., C.M.G., M.P., Secretary of State for Air. The Duke of Sutherland, the chairman of the Club, will preside. The number is limited to 60. Tickets 6*s*. Apply, Secretary, Royal Aero Club. Morning dress.

The 28th Squadron (R.A.F.) Old Boys' Association

ON April 10 next the 28th Squadron (R.A.F.) Old Boys' Association will be holding a social evening at Slater's Restaurant, 34–5, High Holborn (adjoining Chancery Lane Tube station), commencing at 7 p.m. Tickets, 3*s*. single, 5*s*. 6*d*. double, including refreshments. Members and their friends are invited.

A Copenhagen-Tokyo Flight

Two Danish Army pilots, Botved and Herschend, left Copenhagen, in two aeroplanes, *en route* for Tokyo, and reached Berlin that afternoon.

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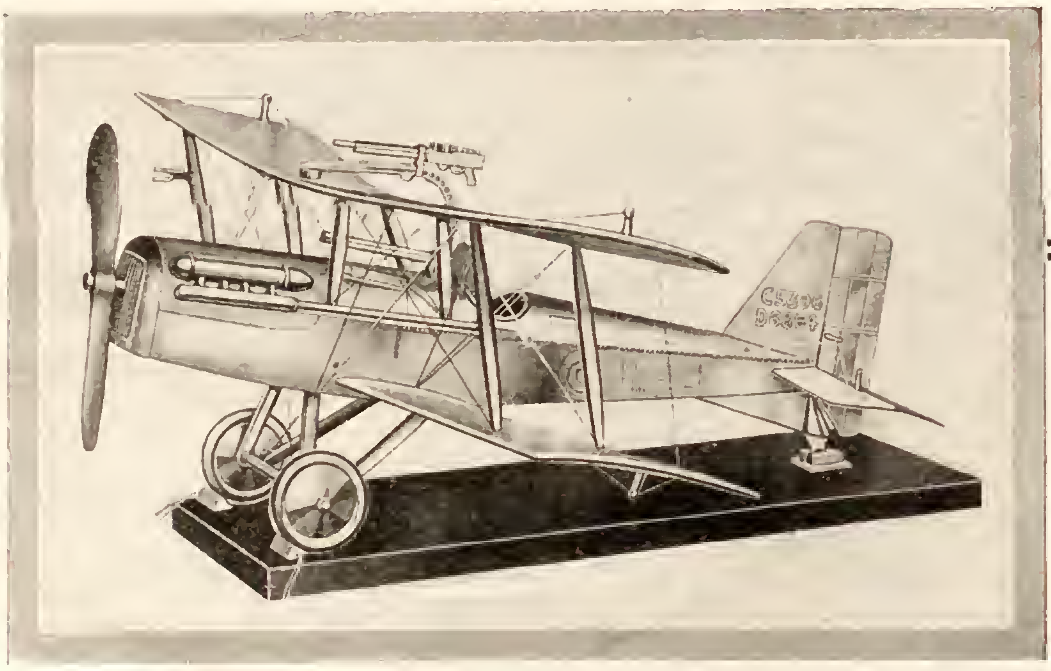

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THE ROYAL AIR FORCE

London Gazette, March 9, 1926

General Duties Branch

Flight-Lieut. E. F. Turner is granted a permanent commn. in this rank; Jan. 1. The following Pilot Offrs. are promoted to rank of Flying Offr.: C. W. L. Trusk, R. W. Steele; Feb. 8. A. O. Pollard, V.C., M.C., D.C.M. (Capt. T.A., Res.), E. H. Newman; Feb. 15. Pilot Offr. on probation E. L. Drew is confirmed in rank; Feb. 19. Pilot Offr. R. N. T. Gape takes rank and precedence as Pilot Offr. as if his appointment in that rank bore date Sept. 1, 1924. Reduction to take effect from Feb. 23. Flying Offr. H. Ford, D.F.C., relinquishes his short service commn. on account of ill-health, and is granted permission to retain rank of Flight-Lieut.; Mar. 10. Pilot Offr. on probation G. C. Crackanthorpe resigns his short service commn.; Mar. 10.

Stores Branch

Flying Offr. C. E. Tidy is granted a permanent commn. in this rank; March 10. The following Pilot Offrs. on probation are confirmed in rank (Feb. 10):—R. H. Clay, E. G. M. Charleson. Flying Officer M. W. Keey is restored to full pay from half-pay; March 8.

Accountant Branch

Flying Officer R. E. Steggall, M.B.E., is transferred to Reserve, Class C; March 5.

Medical Branch

Flying Officer G. P. O'Connell, M.B., is granted permanent commn. in this rank; March 10. The following are granted short service commns. as Flying Officers for three years on active list, with effect from and with seny. of Feb. 23:—J. P. Hederman, E. J. Moekler, M.B.

Memorandum

Sec. Lieut. A. Barnett relinquishes his hon. commn. on enlistment in Supplementary Res. Army; Feb. 17.

Reserve of Air Force Officers

Flying Officer K. C. Whitwell is transferred from Class A to Class B; March 9. The following are transferred from Class A to Class C:—Flight Lieut. C. F. Briggs; March 6. Flying Officer R. V. D. White; March 4. Flying Officer C. H. Boreham is transferred from Class B to Class C; Dec. 17, 1923. Flight Lieut. P. Worthington, M.C., relinquishes his commn. on completion of service; Feb. 1. Pilot Officer A. Lewis resigns his commn.; March 9.

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified:—

General Duties Branch

Wing Commanders: J. O. Archer, C.B.E., to No. 3 Wing H.Q., India, to command; 26.1.26. D. Harries, A.F.C., to R.A.F. Depot, Egypt, for administrative duties; 10.2.26.

Squadron Leaders: R. S. Booth, A.F.C., to No. 5 Flying Training Sch., Sealand; 15.3.26. G. W. Murlis-Green, D.S.O., M.C., to H.Q., India; 5.3.26. A. W. Mylne, to No. 28 Sqdn., India; 15.2.26. J. S. T. Bradley, O.B.E., to H.Q., Air Defences of Gt. Britain; 1.3.26. V. S. Brown, to R.A.F. Depot, on transfer to Home Estab.; 22.2.26.

Flight Lieutenants: A. M. Blake, A.F.C., to Superintendent of Res., Northolt; 15.3.26. W. R. Cox, M.C., A.F.C., R. W. Edwards, T. A. Langford-Sainsbury, D.F.C., A.F.C., and A. C. Bayley, to R.A.F. Depot, on transfer to Home Estab.; 14.2.26. H. V. Pendavis, D.S.O., to No. 7 Group H.Q., Andover; 17.3.26. J. E. MacLennan and W. J. Millen, to R.A.F. Depot, on transfer to Home Estab.; 14.2.26. R. E. G. Fulljames, M.C., to Aircraft Depot, India; 28.1.26. K. E. Ward, to H.Q., Iraq; 5.3.26. A. C. B. Harrison, M.C., to H.Q., India; 5.3.26. N. C. Saward, to No. 1 Sqdn., Iraq; 5.3.26. G. M. F. O'Brien, D.S.C., to R.A.F. Depot, Egypt; 16.2.26. P. Murgatrôyd, to H.Q., Mediterranean; 13.2.26. G. Archer, to No. 7 Sqdn., Bircham Newton; 18.3.26.

Flying Officers: H. T. Satterford, to No. 4 Apprentices' Wing, Cranwell; 14.3.26. R. J. Willson, to No. 28 Sqdn., India; 30.1.26. (Hon. Flt. Lieut.) F. L. Woledge, to No. 8 Sqdn., Iraq; 5.3.26. C. K. J. Coggle, to No. 47 Sqdn., Egypt; 5.3.26. R. A. Ford, to No. 84 Sqdn., Iraq; 5.3.26. H. M. G. Parker, to No. 30 Sqdn., Iraq; 5.3.26. W. E. Johns, to Record Office, Ruislip; 15.3.26. R. G. Mollard, to R.A.F. Depot, on transfer to Home Estab.; 24.2.26. G. M. Trundle, to No. 4 Flying Training Sch., Egypt; 24.2.26. J. F. Tadman, C.G.M., to R.A.F. Depot, Egypt; 6.1.26. E. E. Arnold, D.F.C., to H.Q., Egypt; 24.2.26. F. C. T. Rowe, to No. 14 Sqdn., Palestine; 15.2.26.

Pilot Officers: G. H. C. Keay, to No. 5 Flying Training Sch., Sealand; 15.3.26. L. R. Mizen, to No. 30 Sqdn., Iraq; 5.3.26. F. S. Homersham, D.C.M., M.M., to No. 47 Sqdn., Egypt; 27.2.26. L. B. McGoverne, to Heliopolis Details, Egypt; 27.2.26.

Stores Branch

Squadron Leader F. Tedman, M.B.E., to H.Q., Cranwell; 12.3.26.

Flight Lieutenants: J. Lundon, to R.A.F. Depot, on transfer to Home Estab.; 14.2.26. C. H. Pownall, to H.Q., India; 16.2.26. D. W. Wilson, to R A.F. Depot, Egypt; 23.12.25.

Flying Officers: M. W. Keey, to R.A.F. Depot; 8.3.26. R. Bassett, to R.A.F. Depot, Egypt; 10.2.26.

Accountant Branch

Squadron Leader T. C. Miller, M.C., to No. 3 Stores Depot, Milton; 18.3.26.

Flying Officers: W. J. Heneghan, to Brigade Accountant Office, Iraq; 5.3.26. M. H. Luker, to No. 47 Sqdn., Egypt; 22.2.26.

Medical Branch

Flight Lieutenant (Dental) N. H. Medhurst, to R.A.F. Depot, Egypt; 29.1.26.

Flying Officers: M. J. Marren, M.B., and G. S. Strachan, M.B., to Research Lab. and Med. Officers' Sch. of Instruction, Hampstead, on appointment to Short Service Commns.; 1.3.26.

NAVAL APPOINTMENTS

The following appointments were made by the Admiralty on March 13:

Lieut., R.N. (Flying Officer, R.A..F. R. A. Aldridge, to *Furious* and for No. 404 Flight; March 15.

Royal Air Force

Flight Lieut. E. H. Bryant, to *Eagle*, for No. 460 Flight; Feb. 24.

◆ ◆ ◆ ◆

THE CASE OF MISS DOUGLAS-PENNANT

Regarding the case of Miss Douglas-Pennant and her dismissal from the W.R.A.F. the following letter has been issued to the press:—

Although the Douglas-Pennant case has been clouded and camouflaged by many side-issues, no one can ignore the revelations recently published. To realise that an officer has been condemned and has suffered punishment so severe as summary dismissal from a branch of His Majesty's Service without being informed of the charge against her—a privilege accorded even to the criminal—must come as a shock to all honourable men.

It is now evident that Miss Douglas-Pennant was dismissed summarily from the command of the Women's Royal Air Force and from the corps on secret and uninvestigated information which has never been disclosed to her. This was stated in the Report of the House of Lords Select Committee to have been the cause of her dismissal, but was neither revealed nor investigated at that inquiry. We associate ourselves with the demand of Miss Douglas-Pennant's friends that the secret allegations should be formulated and the evidence in support of them fairly considered, in order that Miss Douglas-Pennant may be given an opportunity of refuting them, and a matter which is disturbing all justice-loving men and women be cleared up to their satisfaction.—Yours, etc.,

Aberdare (Lord Aberdare, President, University of Wales).
Bathurst (Earl Bathurst, C.M.G.).
Charles Barrington (Sir Charles Barrington, Bart.).
St. Clair Baddeley.
Daniel Bangor (the Bishop of Bangor).
Fred. Bligh Bond.
Henry Burnley (the Bishop of Burnley).
Wilmot H. Fawkes (Admiral Sir Wilmot Fawkes, K.C.B., K.C.V.O.).
Everard Feilding (the Hon. Everard Feilding).
J. Fortescue (the Hon. John W. Fortescue, C.V.O., Librarian to the King).
T. C. Fry (the Dean of Lincoln).
Stanley Fuller (ex-Sergt.-Major, R.A.F., Hurst Park Motor Transport Depot).
Peter Green (Canon of Manchester, Chaplain to H.M. the King).
R. T. Gunther (Dr. R. T. Gunther, LL.D., Fellow of Magdalen College, Oxford).
H. J. W. Hetherington (Professor Hetherington, Principal, Glasgow University).
Laurence Housman.
E. T. Jensen.
J. M. Kenworthy (Lieut.-Commander the Hon. J. M. Kenworthy, R.N., M.P.).
Kenyon (Lord Kenyon, K.C.V.O., Pro-Chancellor University of Wales, President University College of North Wales).
David Lamb (Commissioner David Lamb, Salvation Army).
Lambourne (Lord Lambourne, C.V.O.).
Herbert Charles Lott.
W. Manchester (the Bishop of Manchester).
Hewlett Johnson (Dean of Manchester).
Frederick Milner (Right Hon. Sir Frederick Milner, Bart.).
Mostyn (Lord Mostyn, K.C.V.O.).
Henry W. Nevinson.
W. G. Carwardine Probert (High Sheriff of Suffolk).
H. R. Reichel (Sir H. R. Reichel, Principal University College of North Wales).
Arthur Sandbach (Major-General).
Esme Wingfield Stratford (ex-Fellow of King's College, Cambridge).
D. Watts-Morgan (Chairman of the Welsh Party).

AIR POST STAMPS

By DOUGLAS B. ARMSTRONG

More Uruguayan Air Stamps

Although the regular air post service was suspended in Uruguay as far back as March, 1924, the authorities continue to promote special air mail carrying flights upon occasions of national fêtes and anniversaries. Lately, particular aero stamps have been introduced for use on these extraordinary air posts.

The vignette issued for the Montevideo-Florida flights on August 25 last is a diminutive oblong label showing a heron in flight, together with the letter "R," denoting "Recommando," and the value 14c, which was the registration fee. It is printed in black and blue, perforated 12½, and exists in two types bearing the names "Montevideo" or "Florida," respectively. The total printing is said to have comprised 8,000 stamps. Of these 3,000 were affixed to letters flown from Montevideo to Florida, and about 2,000 to those carried on the return journey. The air post cachet employed upon this occasion was oval in form, struck in red, and inscribed "CORREO AEREO 1825 25 De Augosto 1925—MONTEVIDEO (or FLORIDA)".

An effective picture of an Indian warrior watching the flight of an aeroplane across the Pampas is the subject of the design of another special air post stamp of 45 c. green, also oblong in format and lettered "CORREO AEREO," which was created for an exceptional air post flight that took place between Montevideo and Rincon upon the centenary of the Battle of Rincon, September 24, 1925. The fee for air-post letters was fixed at 50 c., made up by the addition of a commemorative 5 c. postage stamp bearing a portrait of General Rivera. The air post stamp was not on sale to the public, but was affixed to flown covers only by the postal officials themselves.

Central American Mail Flights

In a country where railways are few, roads bad, and land communications generally inadequate, the aeroplane offers a practical solution of the transport problem. Central American Governments are waking up to the advantages of the air post service, and many new routes are on the point of being opened up.

An air mail between the Canal Zone and Costa Rica was put in operation on December 29, 1925, reaching San Jose on the same day, where a special cancellation was applied to flown letters, inscribed "San Jose—Servicio Aero Transito."

The inauguration of an air mail service between Colombia and Central America on August 10, 1925, was signalised by the use of a special cachet lettered:—

Primer Correo Aereo
Colombia
America Central

A survey flight over a possible air mail line linking the principal cities of Central America was carried out by three U.S. Army 'planes as far back as February 4-16, 1924, starting from the Canal Zone and terminating at Guatamala City, where a special mail was made up at the G.P.O. for the return flight.

Owing to the late arrival of the train bringing further aerial mail matter a total of only 28 letters was transmitted. These received a special cancellation reading, "Correo Internacional, February 16, 1924. Guatamala, A.C.," and on receipt at Balboa Heights, C.Z., were back-stamped with the receiving mark dated "February 29, 2.30 p.m." It would seem from these particulars that the experiment was in every way an official one, and the covers a worthy addition to the air post records of pioneer flights.

Italian Aero Stamps

The development of the Italian air post service is foreshadowed by the introduction of special stamps for franking air-borne correspondence. As yet these are but four values, viz., 60 centesimi green, 1 lira blue, 1·50 lire yellow, and 5 lire green, and the issue is of a more or less temporary nature, the design being an adaptation of the pneumatic despatch stamps of 1913, with the words, "Posta Aerea" substituted for the former inscription. Ultimately something of a more appropriate character may be expected.

Aero Philately at the New York Stamp Exhibition

It is a striking tribute to the increasing popularity of air post collecting that the Committee of the forthcoming International Stamp Exhibition, to be held in New York in October, has decided to relegate such collections to a class of their own, whilst prominent American air post authority is to be co-opted on the jury. This is the first time that aerophilately has been raised from the rank of a sub-section in the miscellaneous class, and it may be taken as a happy augury.

IMPORTS AND EXPORTS, 1925-1926

Aeroplanes, airships, balloons and parts thereof (not shown separately before 1910). For 1910 and 1911 figures see "Flight" for January 25, 1912; for 1912 and 1913, see "Flight" for January 17, 1914; for 1914, see "Flight" for January 15, 1915; for 1915, see "Flight" for January 13, 1916; for 1916, see "Flight" for January 11, 1917; for 1917, see "Flight" for January 24, 1918; for 1918, see "Flight" for January 16, 1919; for 1919, see "Flight" for January 22, 1920; for 1920, see "Flight" for January 13, 1921; for 1921, see "Flight" for January 19, 1922; for 1922 see "Flight" for January 18, 1923; for 1923, see "Flight" for January 17, 1924; for 1924, see "Flight" for January 22, 1925; for 1925, see "Flight" for January 21, 1926.

	Imports.		Exports.		Re-Exports.	
	1925.	1926.	1925.	1926.	1925.	1926.
	£	£	£	£	£	£
Jan. ..	3,546	494	83,728	130,049	291	—
Feb ..	985	2,089	85,639	40,416	20	6,341
	4,531	2,583	169,367	170,465	311	6,341

⁂

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⁂

PUBLICATIONS RECEIVED

Skyways. By Alan J. Cobham. Nisbet and Co., Ltd., 22, Berners Street, London, W. Price 15*s.* net.

Aeronautical Research Committee Reports and Memoranda: No. 976 (*Ae.* 190).—Some Experiments on a Model of a B.A.T. "Bantam" Aeroplane with Special Reference to Spinning Accidents. November, 1925. Price 1*s.* 3*d.* net. *No.* 988 (*M.*31).—The Air Bubble Viscometer. By G. Barr. April, 1925. Price 9*d.* net. H.M. Stationery Office, Kingsway, London, W.C. 2.

The Air Pilot Monthly Supplement. No. 17. *March,* 1926. The Air Ministry, Kingsway, London, W.C. 2.

Official Gazette of the United States Patent Office. February 23, 1926. United States Patent Office, Washington, D.C., U.S.A.

⁂

AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations: Cyl. = cylinder; i.c. = internal combustion: m. = motor. The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

APPLIED FOR IN 1924

Published March 18, 1926

30,710. C. Lorenzen and Lorenzen-Turbinen-Akt.-Ges. Propulsion of aircraft. (247,699.)

APPLIED FOR IN 1925

Published March 18, 1926

2,930. R. Chillingworth. Aircraft capable of vertical and horizontal flight. (245,053.)
3,112. E. D. Moore. Engine turning-gear. (247,730.)
8,379. R. J. L. Moineau. Flying machines. (231,856.)
13,631. J. A. Prestwich. Lubricating systems. (247,805.)
16,143. Cie. d'Applications Mecaniques. Mounting of rotating bodies. (236,541.)
16,239. W. Johannessen and A. P. Jensen. Parachutes. (247,819.)

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12 ,, ,, ..	30	4	12 ,, ,, ..	33	0

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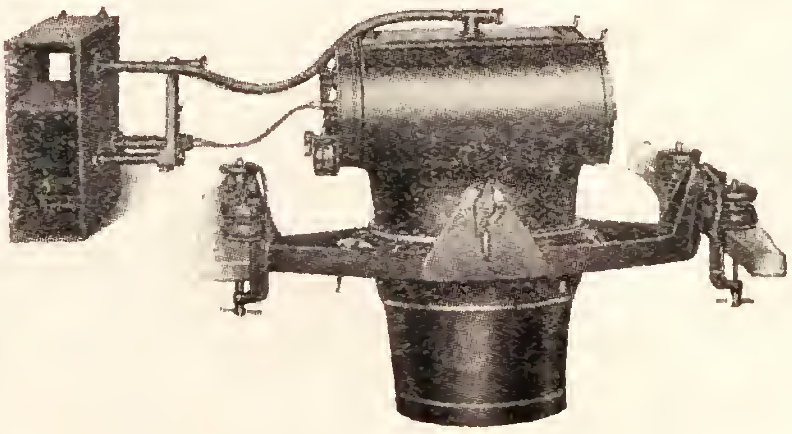

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De Havilland Aircraft Co., Ltd., Stag Lane Aerodrome, Edgware. Kingsbury 160.
Fairey Aviation Co., Hayes, Middlesex. Hayes 136-7-8.
The Gloucestershire Aircraft Co., Ltd., Sunningend Works, Cheltenham. Cheltenham 1161-2-3-4; "Glosaircra, Cheltenham."
Handley-Page, Ltd., Cricklewood. Hampstead 7500.
H. G. Hawker Engineering Co., Ltd., Kingston-on-Thames. Kingston 1988.
N. V. Nederlandsche Vliegtuigenfabriek. Rokin 84, Amsterdam.
Pander & Zonen, Zuid Binnensingel, Den Haag. 34160; "Pander."
Parnall, George, & Co., Park Row, Bristol. 4775 (2 lines); "Warplanes," Bristol.
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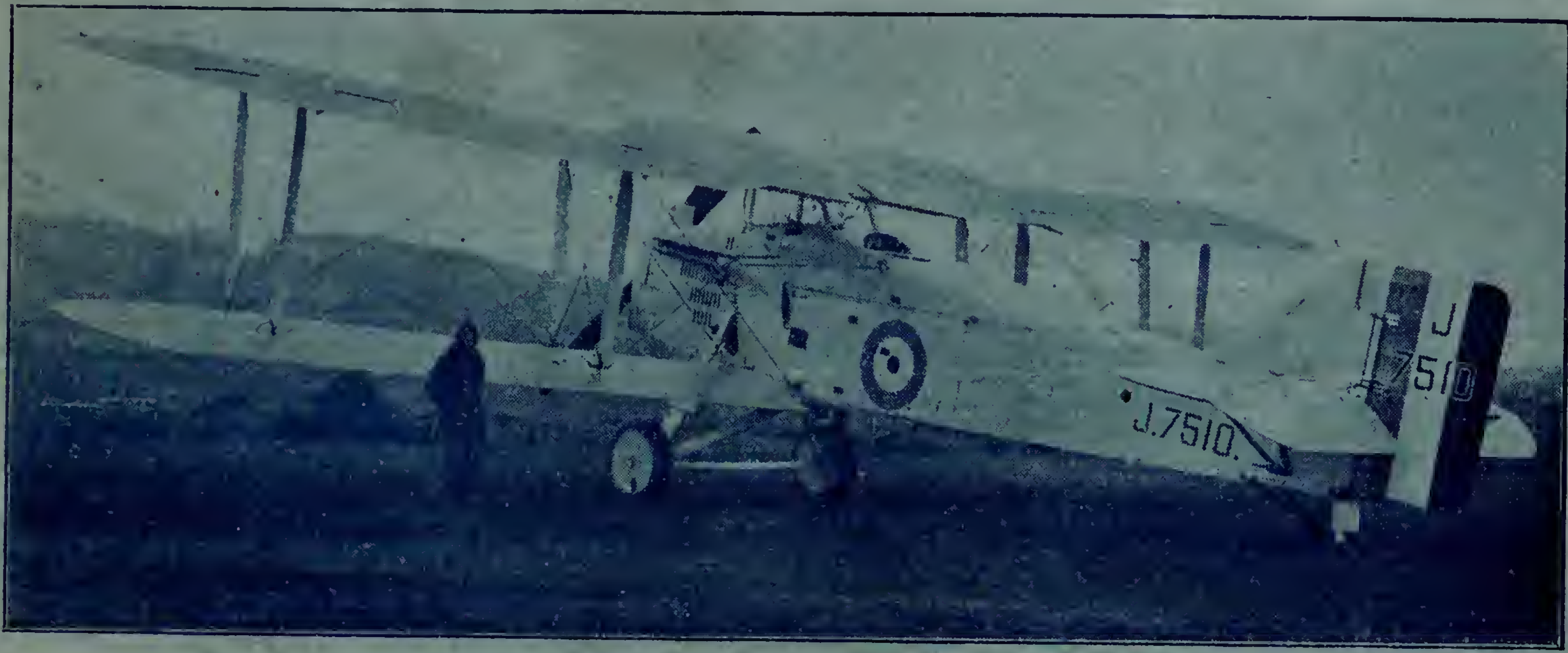

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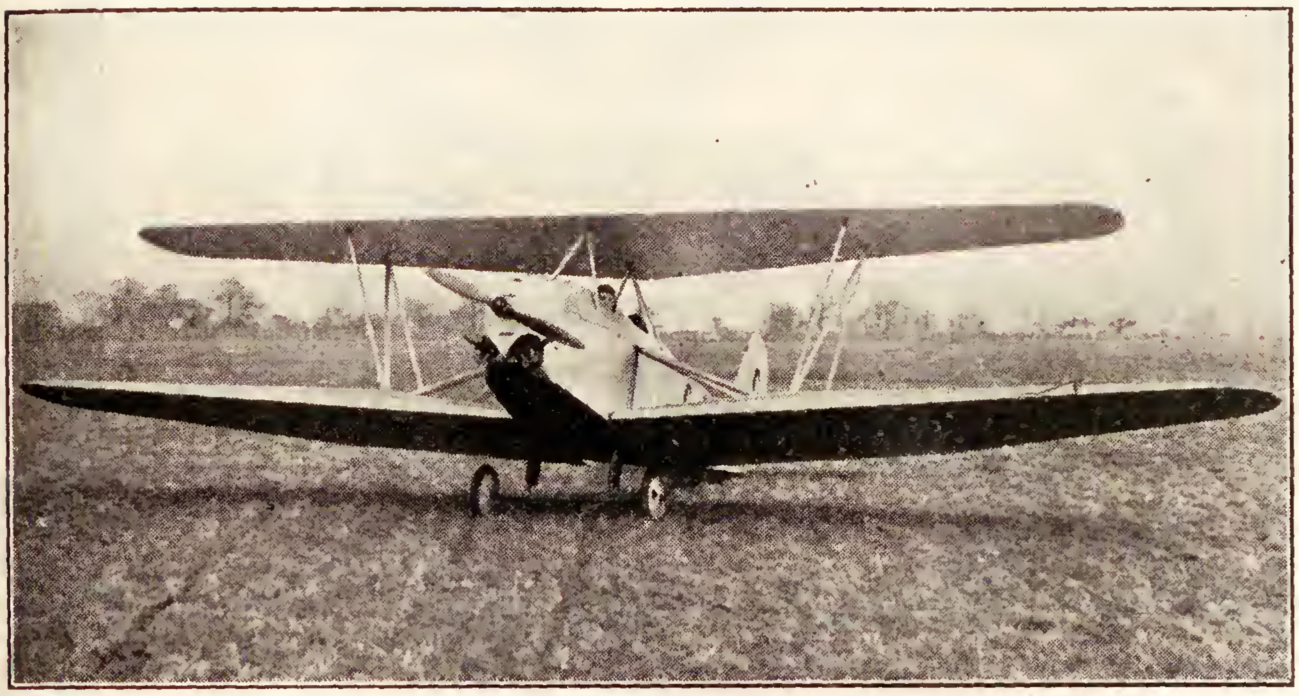

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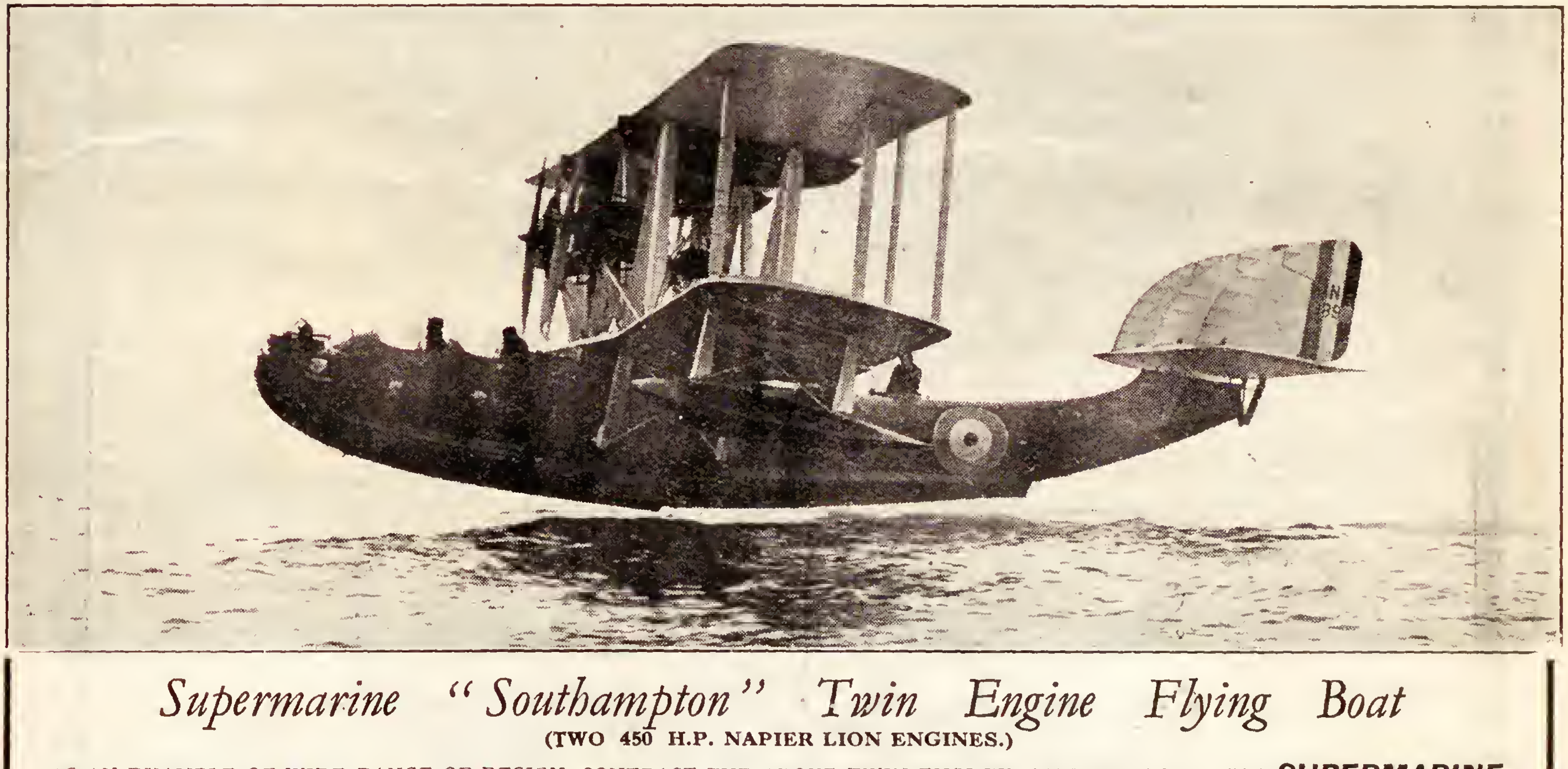

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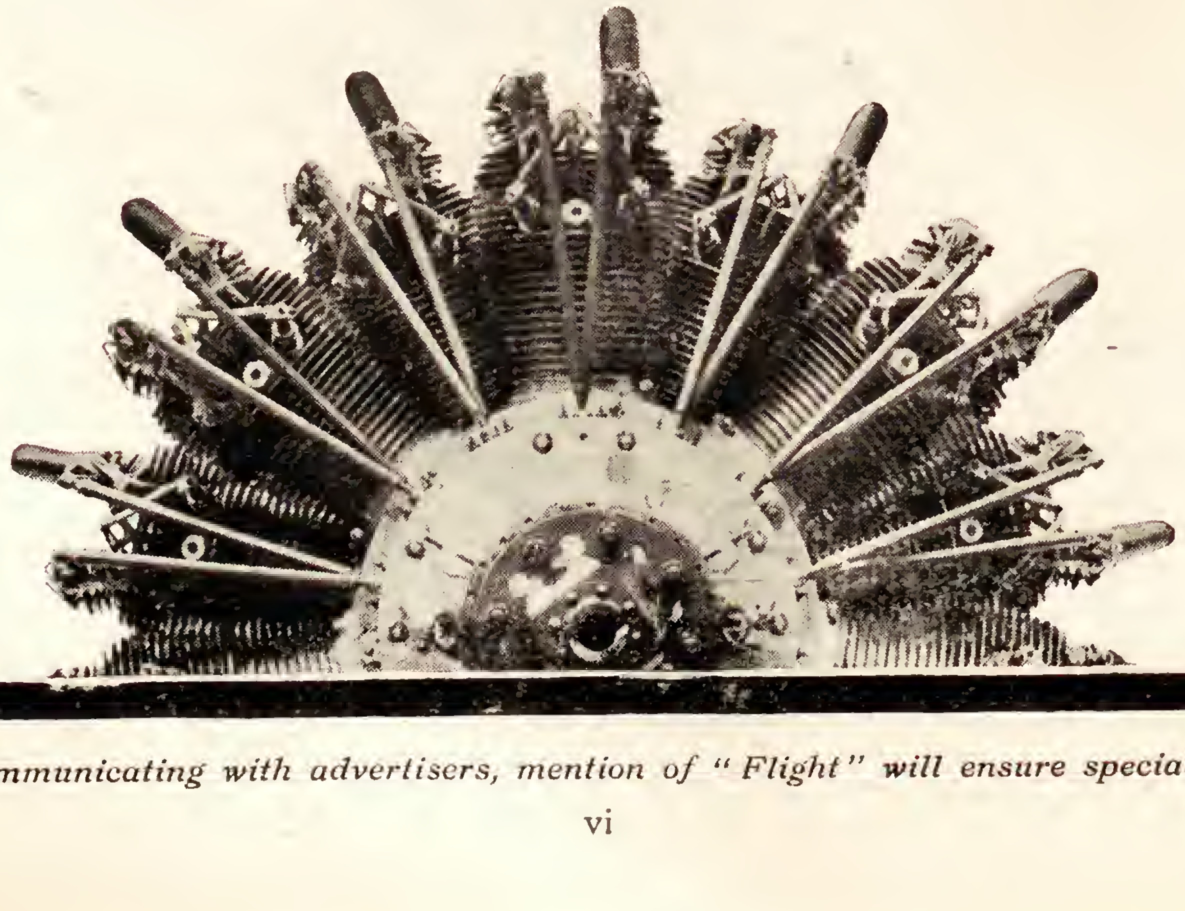

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OFFICIAL ORGAN OF THE ROYAL AERO CLUB OF THE UNITED KINGDOM

No. 900. (No. 12, Vol. XVIII.) MARCH 25, 1926 [Weekly, Price 6d. Post free, 7d.

Flight

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CONTENTS

Editorial Comment PAGE
The Schneider Cup ... 173
Lack of Time ... 174
The Greater Issues ... 174
The Goodyear Semi-Rigid Airship R.S. 1 ... 175
Long Distance Flying. By Alan J. Cobham ... 177
Personals ... 178
THE AIRCRAFT ENGINEER ... 178*a*
The "Evertite" Locknut ... 179
Light 'Plane Club Doings ... 179
Marine Aircraft. By O. E. Simmonds ... 180
Royal Air Force ... 183
R.A.F. Intelligence ... 183
In Parliament ... 183
Society of Model Aeronautical Engineers ... 184

DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:—

1926	
Mar. 25	R.Ae.S. Annual General Meeting.
Mar. 27	R.A.F. *v.* Army, Rugby Match, Twickenham.
Mar. 27	R.A.F. (India) Reunion Dinner.
Mar. 31	Entries close for Schneider Cup Race.
Mar. 31	Royal Aero Club Annual General Meeting.
April 8	Marchese de Pinedo, "A 35,000 Miles Flight," before R.Ae.S.
April 13	Mr. S. H. Evans, A.F.R.Ae.S., M.I.Ae.E. "The Performance of Modern Aircraft —with special reference to the Variable Wing," before Inst.Ae.E.
April 21	Inst.Ae.E. visit to Messrs. D. Napier and Son, Acton.
April 22	Capt. G. T. R. Hill. "The Tailless Aeroplane," before R.Ae.S.
April 29	Lieut.-Col. V. C. Richmond. "Results of Recent Airship Flight Tests," before R.Ae.S.
May	Gordon-Bennett Balloon Race.
May 11	Capt. W. H. Sayers. "The Modern Theory of Aerofoils and its Application to Aeroplane Design," before Inst.Ae.E.

INDEX FOR VOL. XVII

The Index for Vol. xvii of "Flight" (January to December, 1925) is now ready, and can be obtained from the Publishers, 36, Great Queen Street, Kingsway, W.C.2. Price 1s. per copy (1s. 1d. post free)

EDITORIAL COMMENT.

The Schneider Cup

FOR weeks past rumour has been busy on the subject of British challengers for the Schneider Cup seaplane race, which is scheduled to take place at Hampton Roads, Virginia, in October next. FLIGHT has purposely refrained from commenting upon these rumours, since it was felt that no good purpose could be served by publishing anything which might make still more complicated the already difficult task of the Royal Aero Club, the Society of British Aircraft Constructors, and the Air Ministry. It has, of course, been known that these three bodies have been in close consultation, and the spreading of rumours was not calculated to help, and might do a good deal of harm. Now, however, an official statement has been made on the subject of British participation in the 1926 Schneider Cup race, and it has thus given opportunity to refer to the subject. An informal conference between the racing committee of the Royal Aero Club and representatives of the press was held on March 23, when the final decision was communicated and explanatory statements made. The text of the official decision not to enter machines for this year's race was as follows:—

"At a meeting held at the Royal Aero Club on March 19, 1926, at which representatives of the Air Ministry, the Royal Aero Club, the Society of British Aircraft Constructors and others interested in the Schneider Cup were present, it was unanimously decided that it was inexpedient for the Royal Aero Club to make a challenge for the Schneider Cup Race this year."

The decision will doubtless be received with general regret, but our readers may rest assured that it was not reached until the problem had been thoroughly discussed, and that nobody regretted the necessity for refraining from entering machines more than did those directly concerned.

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Lack of Time

In order that the reasons for the decision may be fully appreciated, it will be necessary to refer back, briefly, to the earlier history of the Schneider Cup race. When the trophy was first put up by M. Jacques Schneider, a member of the famous French armament firm of that name, it is fairly safe to say that no such speeds and engine powers as reached by modern machines had been contemplated. The earlier Schneider Cup machines were powered with engines of round about 100 h.p., and the machines themselves were not so expensive to build but that aircraft firms, or even private individuals, could afford to enter. Gradually, however, the engine powers employed grew and grew, until something like 700 h.p. has been reached, with every indication that still higher horse-powers will be called for. This has naturally meant not only a vast increase in the cost of engines, but also an equally large increase in the cost of the machines as a whole, and—what is perhaps even more important—the necessity for a much longer period of preparation, not only in the matter of testing machines, engines, airscrews, floats, etc., thoroughly, but also in the preparation of the pilots, the handling of such high-speed machines requiring special training and a great deal of practising.

It is thus seen that from every point of view the Schneider Cup race has become infinitely more difficult than it was in the earlier days—financially, technically, and as regards the human element. To the credit of the United States it must be said that they were the first to realise that the only way of tackling the Schneider Cup problem with any hope of success was to make of it a national affair. This they proceeded to do, and in 1923, when they challenged Great Britain at Cowes, they sent over machines and crews backed by the financial and best technical resources of the United States Government. As all the world knows, the Americans won a decisive victory at Cowes, but what everyone did not realise was that America had changed the nature of the Schneider Cup race from a more or less private sporting affair to putting it on a national basis. The British Government has been slow to follow suit, but last year a beginning was made, by ordering a few machines and permitting their constructors to enter them in the race. This year still greater support had been promised, but the fact remained that if we were to have any hopes of winning the Schneider Cup very strenuous efforts had to be made, and the time for making them was considered to be too short. As a result the decision not to enter. Under the circumstances we feel that this decision was the only one to which those concerned could have come. To have rushed machines through for the race, only to discover at the last minute some unexpected "snag," which would have prevented them from putting up a creditable performance would scarcely be calculated to increase British prestige abroad, and that being so, it is surely more dignified to be perfectly frank in the matter, and to state that we regret that we do not feel that we can undertake the construction of machines in time for October.

While on the subject of the Schneider Cup, it may be stated that the Royal Aero Club proposes, at the next meeting of the Federation Aeronautique Internationale in September, to suggest that in the future the Schneider Cup race (if it be still an existing event) be held, not annually, as in the past, but every other year. The suggestion is a very practical one, as the difficulties of building and testing machines for the race have now become such as to require a much longer period of preparation. Whether the suggestion will meet the views of other nations is, of course somewhat problematical.

This brings us to the question that will naturally be asked, *i.e.*, will there be a race this year? The answer to that rests mainly with America. If no country enters machines, America has a perfect right to claim a "walk-over." She has already once forgone that right—a sporting gesture which this country duly appreciated—and if she should decline to declare "no race" this year, small blame could attach to her. In that case the Cup would become the permanent property of the United States, and the question would then arise whether a new cup should be offered, and if so under similar conditions or under totally different ones.

◆ ◆ ◆

The Greater Issues

From the fact that it has been decided not to enter machines for this year's Schneider Cup race, it must not be assumed that the development of high-speed machines is to be abandoned. On the contrary, as we have already indicated, Government support for a policy of high-speed development is to be increased, and orders have already been placed by the Air Ministry for several high-speed machines and for new types of engines. These will be completed during the coming summer, and will then be thoroughly tested out, and as a result of the tests further machines will be built, which will be available for the race in 1927, if it be still open. The Air Ministry, now realising the importance of world's records, will not only permit, but will encourage attempts by these machines to establish new world's records, and it is thought that, if successful, the results will be of far greater importance to British aviation than attempting, under the present conditions, to win the Schneider Cup. With which we are cordially in agreement.

This decision is to be welcomed most wholeheartedly, and it is to be hoped that the principle will later be extended to include service machines. It is now several years ago that FLIGHT first pleaded for permission to be given to constructors of service aircraft to let them claim such performances as constituted world's records, performances which certain machines put up as a matter of routine service work. In his paper before the Institution of Aeronautical Engineers, Mr. O. E. Simmonds stated that, with a certain Supermarine flying boat, it would be possible, if permitted, to beat 32 out of the 39 existing world's records, and to put up four new world's records in classes not hitherto successfully attempted. While, therefore, we applaud the decision to go for speed records, we do most certainly ask that constructors be permitted to attempt other records of which certain service machines are capable.

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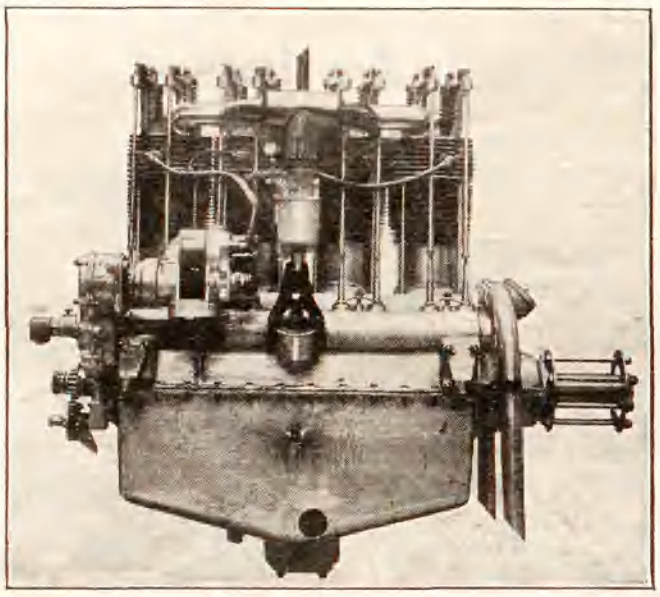
We have received a letter from the Chief Instructor of the Newcastle-upon-Tyne Aero Club, Major L. A. Packman, referring to the reliability of the three A.D.C. "Cirrus" engines in use by the Club, which letter we reproduce below.



" Messrs. A.D.C. Aircraft, Ltd.,
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" Having run three of your 27/60 h.p. ' Cirrus ' engines for an aggregate of four hundred and fifteen (415) hours without a single involuntary stoppage, I feel it is incumbent upon me to acquaint you of the fact.

" Engine reliability is, of course, at all times of the utmost importance, but its value is especially enhanced when used in a training machine, where confidence in one's engine is of inestimable value to a pupil.

" Your achievement in producing a Light Aeroplane Engine of such outstanding merit is, I consider, worthy of the highest praise.

" Yours sincerely,
L. A. Packman, Major (Retired),
Instructor to the Newcastle-upon-Tyne Aero Club."

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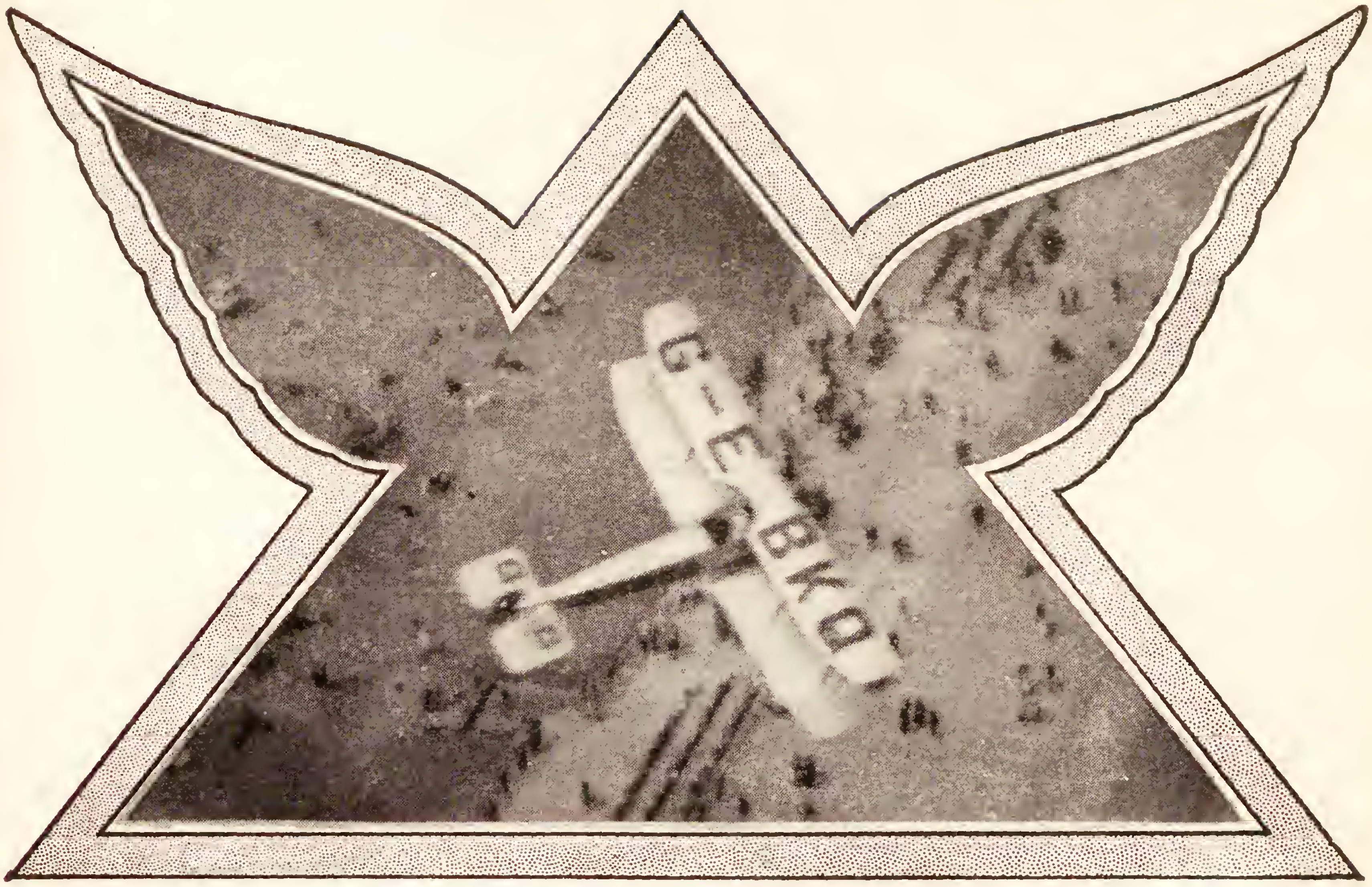

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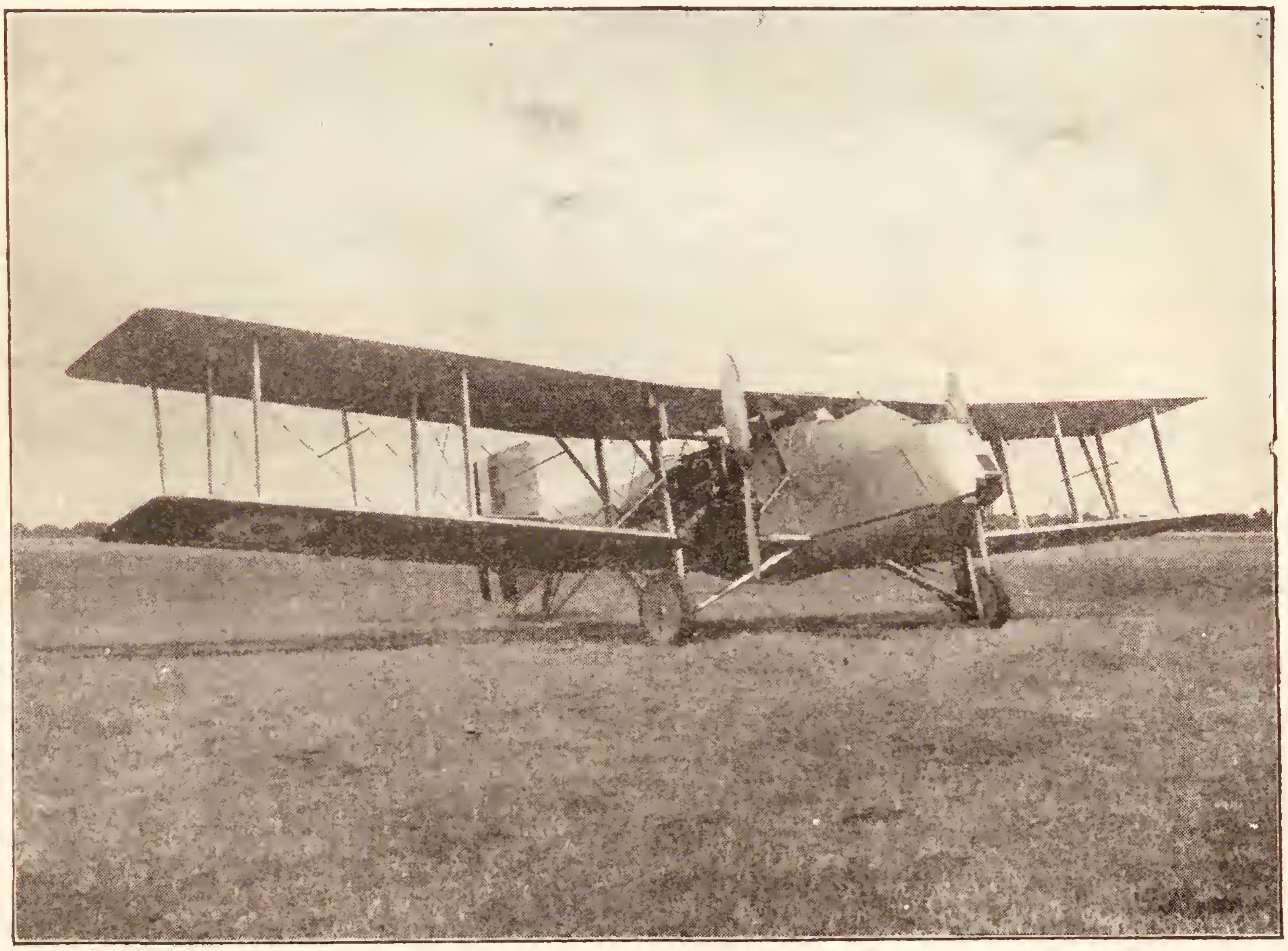

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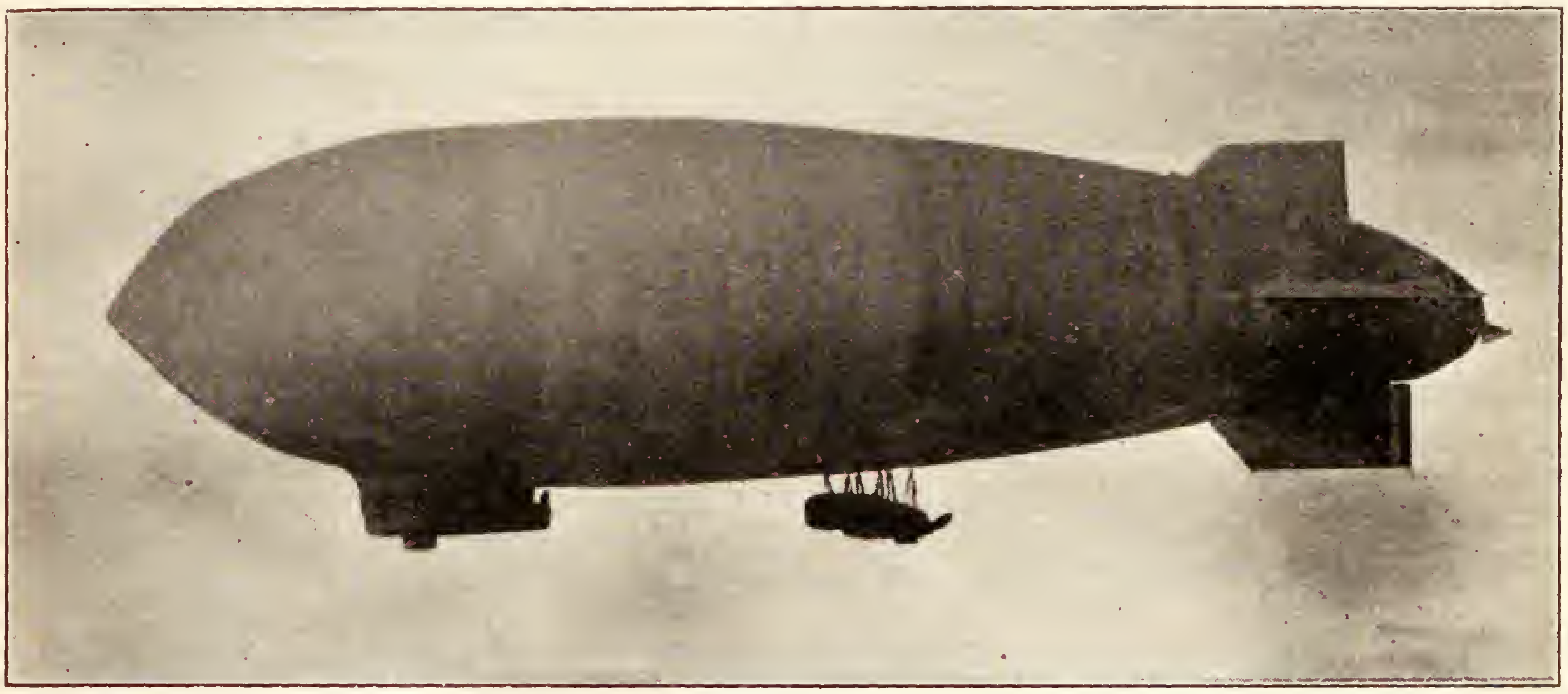
THE GOODYEAR SEMI-RIGID AIRSHIP "RS-1"

THE semi-rigid airship "RS-1," built by The Goodyear Tyre and Rubber Co., of Akron, Ohio, for the U.S. Army Air Service, has successfully passed through its recent test flight period, and is now listed for active flying duty at Scott Field army post near St. Louis.

The first American-built semi-rigid airship, it is 282 ft. in length, 70 ft. 6 in. diameter, and has a gas volume of 720,000 cub. ft. Powered with four low-compression Liberty engines in two streamlined power cars located aft and suspended from the keel, the RS-1 develops a total of 1,200 h.p., giving a maximum speed of over 75 m.p.h. under favourable conditions, and a cruising speed of 45 m.p.h., making it the fastest as well as the largest airship in the U.S. Army Air Service.



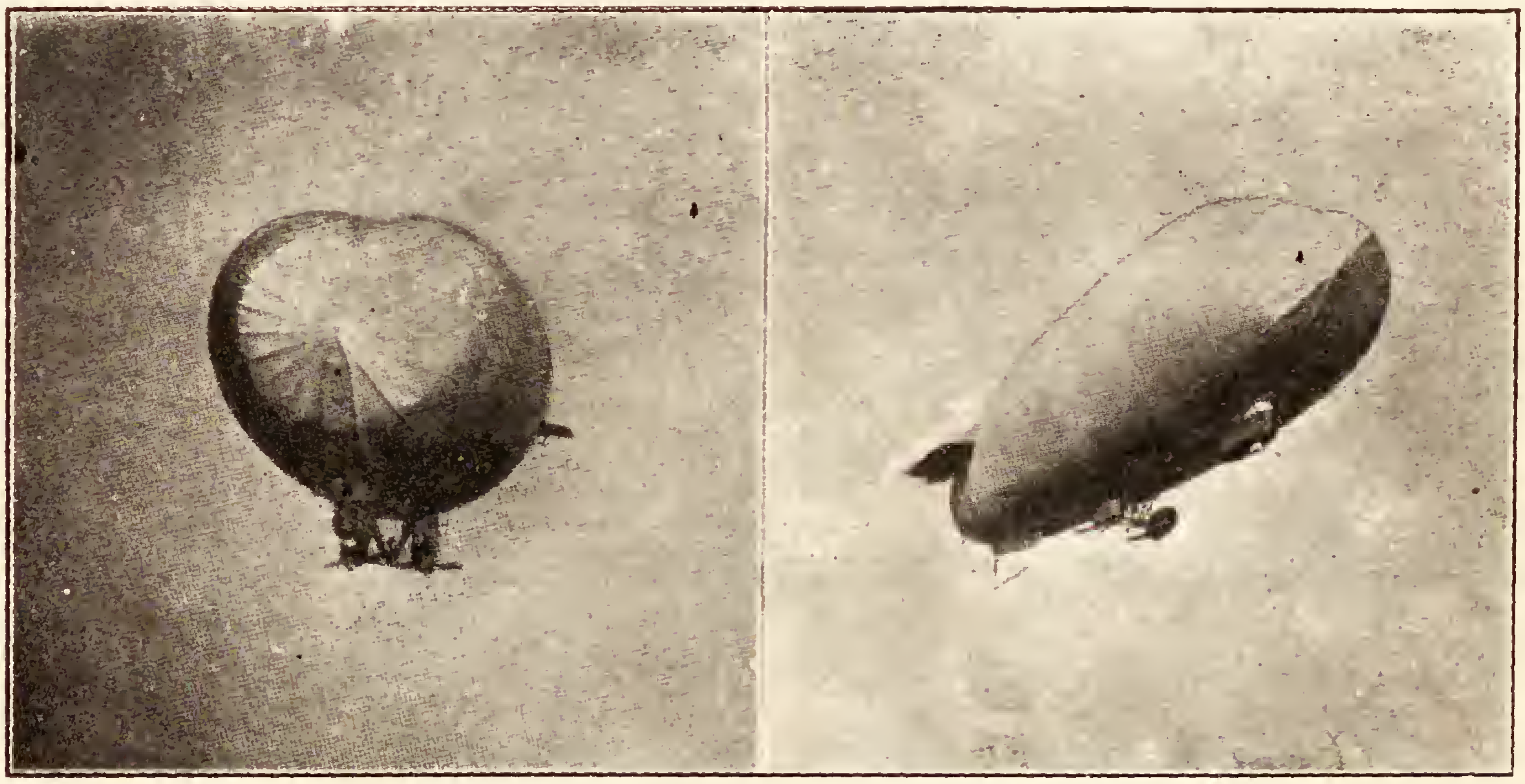
THE GOODYEAR "RS-1" AIRSHIP ; This is the first semi-rigid airship to be built in America.

Construction of the parts for the RS-1 commenced in the Goodyear factory at Akron towards the end of 1924, and the parts were then taken to Scott Field for assembly last spring. Although the ship was completed late in 1925, a slight mishap caused by a mistake made by a rigger during erection, prevented trials being carried out until early this year. On its initial trial flight, on January 8, it made a successful trip of over an hour's duration in a mild snowstorm, carrying a crew of eight men and with Lieut. Orval Anderson in charge.

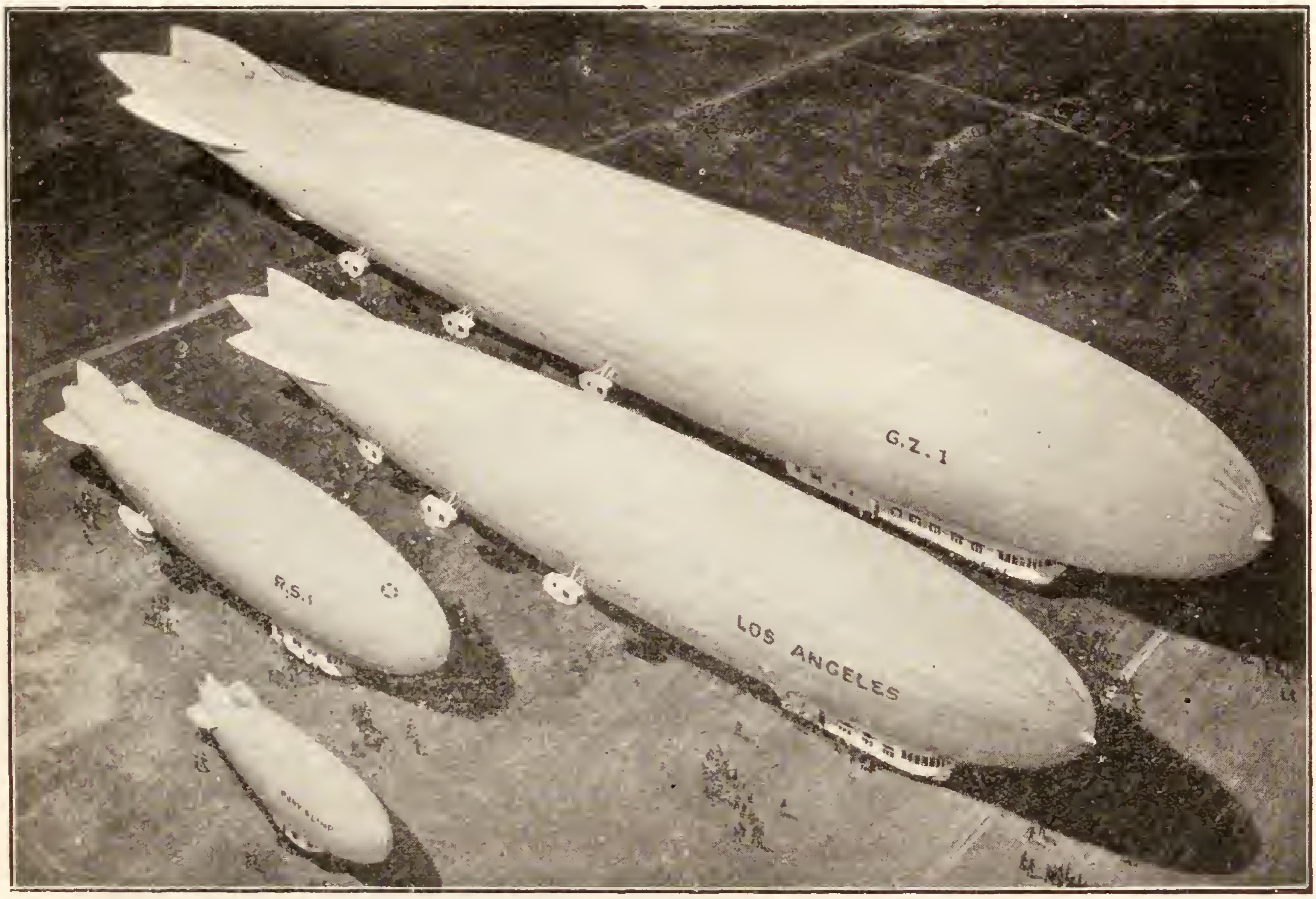
During a subsequent test flight the RS-1 encountered extremely bumpy flying conditions and winds that at times exceeded 50 m.p.h. in velocity. After a flight of 19 hours' duration, however, the RS-1 was landed at its home base in a high ground wind without mishap, the personnel rendering a favourable report of the ship's entire performance.

The RS-1 resembles in many ways the Italian semi-rigid airship N.1, previously described in FLIGHT, although the American ship is slightly larger and is inflated with helium.

Along the belly of the envelope is an enclosed aluminium alloy keel, suspended by catenary cables, which attach to the three points of the keel at 10-ft. intervals. The load coming on the centre catenary gives the envelope a heart-shape transverse cross-section, of which the greatest dimensions are 66·5 ft. by 73 ft. high. The envelope is divided into four compartments by transverse diaphragms. The centre diaphragm is a solid wall, while the end ones have surge holes near the bottom in the gas and air compartments.



THE GOODYEAR "RS-1" AIRSHIP : Two views of the new U.S. Army airship showing the heart-shaped cross-section of the envelope.



SOME GOODYEAR " STEPPING-STONES " : This illustration is intended to show, for comparison, four types of airship, viz :—from left to right, the " Pony Blimp " of 49,500 cub. ft. ; the " RS-1 " described this week, the rigid " Los Angeles " of 2,470,000 cub. ft., and the super rigid G-Z1 (projected).

The air ballonets, with a total capacity of 224,000 cub. ft., are also divided into four by these diaphragms.

The nose of the envelope is provided with 19 duralumin battens secured to the keel extremity, laced to patches on the envelope and supported laterally by five sets of brace wires and two telescopic rings of duralumin tubing. The nose is also provided with mast mooring equipment.

The keel, which forms a great vertebrate spinal column, is constructed of duralumin columns, Phœnix type, of a maximum length of 10 ft. These columns are connected by a ball and socket joint in a forged lynite housing, which housings are part of the rigid transverse triangles. The tension wires of the keel are of streamline form. The fuel, oil, and water ballast tanks, and fore and aft drag ropes are suspended in the keel from the transverse keel frames.

A control car, 35 ft. long and entirely enclosed, is suspended from the keel under the nose of the ship. This car contains the navigating controls, sleeping facilities for officers and men, a motion picture camera and a radio installation.

It is constructed of duralumin framework with fabric and metal sheathing. The control room is separated from the rest of the car by a hollow partition which houses the control cables coming down from the keel. The equipment of the pilot car, in addition to the latest navigating instruments, includes an SCR—135 radio set, a type B-3 camera, bomber's cockpit and equipment, four berths, an auxiliary power-driven 5,000-cub. ft. capacity air blower, map table, &c., &c. The car weighs 1,900 lb., exclusive of radio, camera, and bomb sight.

The armament includes bomb racks of 3,500-lb. capacity and single machine-gun mounts on both sides of the forward end of the pilot car ; a gun mount can easily be arranged for at the extreme bow of the ship, if required.

Owing to the fact that the RS-1 is the first of the semi-rigid type to be built in America, it has been designed to have a high factor of safety, under all conditions, performance being a secondary consideration if it interfered with adequate strength.

It has been designed for training, photographic, and patrol duties, and will later be equipped with a newly designed suspension device to pick up and release a small aeroplane during flight—a development with which the U.S. Army Air Service has experimented for the past three years.

Although considerably smaller than the American rigid airships—the ill-fated " Shenandoah " and the " Los Angeles " —the RS-1 has been designed so that it can be moored to the masts erected for the rigids. It may be mentioned in conclusion that the RS-1, while the first airship of the semi-rigid type constructed in America, belongs to a long line of lighter-than-air craft turned out by the Goodyear Tyre and Rubber Co., which some little while back acquired the patent rights of the German Zeppelin Co. for North America.

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Air Minister's Assistant Private Secretary

The Air Ministry announces that The Rt. Hon. Sir Samuel Hoare, Bt., C.M.G., M.P., Secretary of State for Air, has appointed Mr. Geoffrey Lloyd to be his Assistant Private Secretary (unpaid).

The African Flights

The four R.A.F. Fairey IIID biplanes (Napier " Lions ") under Wing-Commander Pulford continued the Cairo–Cape Town flight from Kisumu (Kenya) on March 17 and reached Tabora, via Mwanza. At Tabora they carried out Army co-operation exercises with the 2nd Battalion of the King's African Rifles on March 18, and resumed their journey on March 22, when they flew on to N'Dola. Proceeding the next day, they arrived at Broken Hill, in Northern Rhodesia. Lieut. Medaets and his two companions, who are flying from Brussels to Kinshasa on a Breguet XIX biplane, reached Mongalla from Atbara on March 17. By March 19 they had got as far as Lisala, in Belgian Congo, and on Sunday morning, March 21, they reached Kinshasa, having thus completed about 5,000 miles in 12 days, or 55 hours' flying time.

Plans for another flight to Cape Town are reported, this time a Swiss effort by Lieut. Mittelholzer (who recently flew from Switzerland to Teheran). This pilot, who will be accompanied by Lieut.-Col. Gouzy, a Swiss journalist, will make the attempt on a seaplane, flying via Athens, Cairo, and Zambesi. The object of the flight is to take films and photographs of wild animal life in the forests of Africa.

LONG-DISTANCE AEROPLANE FLIGHTS*

Mr. Alan J. Cobham, who has just completed a remarkable 17,000-mile flight from London to Cape Town and back, gave a very interesting lecture before the Royal Aeronautical Society last Thursday. Mr. Cobham first apologised for being unable to prepare his lecture, as he had intended, but he had had so little time since he came back—in fact, he had only started on his paper that afternoon.

There were, he said, two main types of long-distance flying. Firstly, long non-stop flights, and, secondly, long flying journeys where many landings were made. The former, so far, had mostly been made purely as stunts or demonstrations of propaganda of some particular type of aircraft. These were very spectacular, and would, he thought, always be a good advertising medium. A few had been made as a commercial proposition, to carry some important dispatches, photographs or special passenger.

The length of a long non-stop flight depended practically on the petrol capacity of the aeroplane, which probably had been increased until the extra weight brought the machine up to its maximum loading. Thus it was up to the designer to work out which was the most economical—a machine that could lift a tremendous load at moderate cruising speed, or the very fast machine which could not carry such a big load. Personally, he thought, the greatest long-distance efficiency came from a machine half-way between these two extremes.

On the question of petrol economy he thought the extra speed gained by opening out the engine in no way paid in distance covered for the extra fuel so used—the greatest distance on a given quantity of fuel could always be obtained by running at approximately two-thirds one's horse-power.

Mr. Cobham then pointed out the great disadvantage to a long non-stop flight, especially for commercial work, owing to the necessity of an enormous petrol reserve that must be carried in order to cope with a head wind. He showed that the weight of such a reserve was far greater in proportion to that required for a short-distance flight.

The question of refuelling, said Mr. Cobham, was purely a matter of organisation, and to-day, even on the best aerodromes, it was hardly possible to land, fill up and get away again in under an hour. He thought the job should not take one quarter of this time, and as proof he quoted the case of the King's Cup Race (1924), where competitors were allowed ten minutes on their handicap for refuelling. Although it was doubted if this could be done in the time, by proper organisation it was actually accomplished within two minutes. If it was possible to refuel in two minutes, what use was there, he asked, in a long non-stop flight ?

It would be seen, therefore, proceeded Mr. Cobham, how important a part good ground organisation would play in the development of aviation. The main thing in all flying was speed, so why, having gained hours by flying from one place to another, waste it all again by inefficient service on an aerodrome ? He therefore emphasised the importance of revolutionising the existing modes of refuelling. Instead of pouring cans of petrol through a hole in the top of a tank, or pumping, slowly, in 5-gallon measures through the same hole, surely in these days of modern engineering it would be possible, having landed within 20 yards of a given spot, for a flexible pipe to be fitted (by a quick attachment) to a valve at some accessible and convenient point on the aeroplane and petrol under pressure put into the tanks at 50 gallons a minute or more ?

The varying changes of weather conditions, said Mr. Cobham, was one of the great difficulties of long non-stop flights, owing to the fact that the great distances covered very often go from one weather zone to another. Therefore unless there was an elaborate system of wireless communication, the machine that landed often would have the advantage of picking up weather reports of conditions ahead.

Another point to be remembered on long non-stop flights was that even for the most hardened it was not good for the passengers—none would do it for pleasure and few out of necessity. It was also very difficult to maintain regularity on a long non-stop flight.

Referring to the effect of long non-stop flights on the pilot, Mr. Cobham said that from his own experience he always noticed that the first half-hour of the flight always seemed the longest. After four or five hours continuous flying, except that he may become a little fidgety he does not usually notice any undue strain and can generally carry on without any desire for food—possibly because he is fed by the oxygen in the pure air in which he flies. In his own longest non-stop flight (London-Madrid) of 9 hours 40 mins. he was quite fresh at the end and able to attend to his refuelling and then carry on for another four hours to Tangier.

He thought the most fatiguing part of flying was worry—worry caused by lack of confidence in the machine and engine and the worry of whether one's destination can be reached on the petrol supply, or the difficulty of finding one's way. As time goes on improved aircraft will banish most of these worries, especially with the development of the three-engined machine. The only other worry the pilot has is that of encountering bad weather. Regarding the subject of navigation, Mr. Cobham stated that the pilot while piloting could never be a real navigator, because while it may not be a mental impossibility to do the two it is a physical impossibility as the pilot only has one pair of hands ! He thought, however, that the navigator should most certainly be a pilot, and possibly in the future the stepping stones in the pilot's profession would be second pilot, first pilot, and commander navigator. The commander navigator of the future big air liners would have had years of experience in piloting a machine over a particular air line, and he would be in charge and navigate the liner. The first pilot would no doubt take the aeroplane off the ground and put it on its course in the air, when it will be taken over by the second pilot. On moments of emergency or when sighting the next port the first pilot would take charge.

His own system of navigating was purely one of dead reckoning combined with map reading (using the map to check up drift). A good system was to draw a line on the map between the two points and then take the compass bearing with a protractor. Having allowed for variation and deviation and ascertained magnetic bearing and set the compass accordingly, one set off on the bearing indicated. After the first few miles one located the first landmark on the line—if one passed right over it the course was free from drift, if not one must allow a few degrees (right or left) to compensate this. This was repeated every few miles, but after 20 or 30 miles it was quite simple to find out the correct bearing, allowing for drift, and by carrying on this course it was easy to hit up one's destination by continually checking up the position by the line on the map.

After referring briefly to other matters regarding navigating, Mr. Cobham came to the question of long-distance flights in the nature of aerial tours, from one country to another, or long-distance survey flights across the world. Possibly, he said, these flights were the finest test for both machine and engine that it was possible to have. From his own experience one could fly a machine round an aerodrome for years and really get to know little about it, for it was not until one took that same aeroplane out into the blue across the world that one began to find all its faults and snags.

For general touring work and everyday long distance flights it should be remembered that an engine was required in the early days of aviation that would run on any kind of fuel and lubricant that could be found available. On the other hand when special supplies were laid down these difficulties were eliminated.

In comparing his two recent flights—Rangoon and back, and Cape Town and back—Mr. Cobham said that the outstanding difference between them was the fact that whereas the flight to Rangoon was accomplished on a DH 50 with a 230 h.p. Siddeley " Puma " engine, the flight from London to Cape Town could never have been accomplished with this engine. That was why they had to install extra horse-power in the form of a Siddeley " Jaguar ". This was mainly due to the high altitude aerodromes of Central Africa.

Referring to the subject of rarefied atmospheres, Mr. Cobham stated that there were three ways of getting over the difficulty. One was by light loading, the other was by extra horse-power, and the third was by constructing huge aerodromes. Personally, he thought the best course of action was to adopt some of each of the last two—construct a machine with about 35 per cent. more horse-power and an aerodrome double the usual size, a good 1,000 yards square. Mr. Cobham then referred to one or two instances in this connection that occurred during the London-Cape Town flight.

Mr. Cobham stated that he had found on long distance flights when journeying across the world that providing one had sufficient sleep it was possible to keep up, providing also one had no other undue worries, six to eight hundred miles per day, and that after the first few days one settled down to this mode of existence, getting better able to carry on at this rate as one progressed.

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* Paper read by Mr. Alan J. Cobham before the Royal Aeronautical Society on March 18, 1926.

Nevertheless, Mr. Cobham gave it as his opinion that world aeroplane routes would have to be run with relays of machines—every 300 miles or so—improved methods of refuelling, previously referred to, making such a system practicable, without loss of time. Furthermore, the passengers would, without doubt, be glad of an opportunity for stretching their legs when changing from one machine to another at each stage.

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Personals

Married

Francis S. S. Lamprey (Green Howards, seconded to R.A.F.), younger son of A. S. Lamprey, M.A., School House, Ashford, Kent, was married on March 17, at St. Mary Magdalene's, Wandsworth, to Agnes, only child of the late Capt. Dixon, M.C. (Suffolk Regt.), and of Mrs. Dixon, of Dover.

To be Married

The engagement is announced between Hugh Norman Davies, R.A.F., son of Mr. and Mrs. Hugh Davies, London, S.W.6, and Dorothy, elder daughter of Mr. and Mrs. E. F. Ievers, Croft House, Epsom.

The engagement is announced of Oliver Humphrey Cantrill, late R.N.A.S., of Dooars, India, eldest son of Mr. E. Crosbee Cantrill (Geological Survey) and Mrs. Cantrill, Ridgecroft, Kidderminster, and Margaret Isobel (Bunny), elder daughter of the late Mr. and Mrs. David Burnett, of Golden Grove, Carmarthenshire.

The engagement is announced between Flight-Lieut. Edward Goodwin Hilton, D.F.C., A.F.C., R.A.F., son of the late Mr and Mrs. J. E. Hilton, of Lambourne, Berks, and Joyce Elizabeth, younger daughter of Mr. and Mrs. Herbert J. Martin, Mason's Bridge, Hadleigh, Suffolk.

The engagement is announced between Mr. Terence Hume Langrishe, late Irish Guards and R.A.F., only surviving son of Sir Hercules Langrishe, Bart., and Lady Langrishe, of Knocktopher Abbey, Co. Kilkenny, and Miss Joan Grigg, eldest daughter of Maj. Ralph Grigg, late 18th Hus., and Mrs. Grigg, of 42, Hertford Street, Mayfair, London.

The engagement is announced between Richard M. Thomas, R.A.F., of Llanberis House, Moseley, Birmingham, and Dorothea Wyndham Knatchbull, second daughter of Mr. and Mrs. Knatchbull, of the Manor House, Winsley, near Bradford-on-Avon.

The engagement is announced between Leonard C. Lewis, late R.A.F., youngest son of Canon F. E. Lewis and the late Mrs. Lewis, and Juliet Evelyn Mary, only daughter of the late Rev. Wilfred Rogers and Mrs. Rogers, of Tremedden, Falmouth.

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"TOMMY" LYONS

An Appreciation by one who knew him.

In 1914 the Aeronautics Directorate of the War Office consisted of eight officers and the same number of N.C.O.'s and civilians. The Junior Lieutenant—graded as Staff Captain—had been commissioned from the ranks but three months previously.

In 1917 the Directorate consisted of 168 officers and many N.C.O.'s and civilians, and our lieutenant of 1914 was in charge of the administration, graded as Deputy Assistant Director.

He was whom we later knew as Wing-Commander "Tommy" Lyons, O.B.E., Knight of the Legion of Honour, and also the Order of St. Anne of Russia.

What he had done during those few years was known mostly to himself only. His juniors knew there was "something doing." His seniors only knew that it was done.

He foresaw things in a manner uncanny, and with obstructionists, particularly amateurs—and there were many—T.O.L. was a factor to be reckoned with. It mattered not whether in England or France, a few strokes with his pen on a chit—and, oh, how we who served with him knew those chits—and the difficulties were cleared. A right man had been found by him for a specific job. That man had to be placed in that job. Another was found useless. He was transferred with as little fuss as one changes one's boots.

He had the unique distinction of having been concerned in every department of the Air Ministry and on the formation of that separate body was sole resident officer throughout the hardest days of the war. Thus, after a hard day in the office he would be at the call of everyone through the night from the Secretary of State, to a mother's enquiries regarding a son—from the despatch of a squadron of machines to an application for an extension of leave.

It would take a book to tell all he did, and it is a great pity that he did not live to write that book in his retirement as he intended.

In 1920 he was sent to command No. 4 Stores Depot, Ickenham, the site of which he himself chose in 1916, and here he endeared himself to all with whom he worked and here after the stress of war, we learned most of what was in the real Tommy Lyons.

He was sent to Iraq in 1921, where, after doing further constructive staff work he was invalided home and after a long spell of sickness followed by a short spell of staff work at Spittlegate, was reposted to his old depot (No. 4) in the autumn of 1923.

His system was control and not interference. He placed the greatest reliance on the integrity of those serving under him and satisfied himself by results and occasional surprise checks.

He had been heard to remark that his depot did not require "commanding." If anything had to be done, he pressed a button and it happened.

Many times, owing to pressure of office work when he had not been able to tour his depot, has he stood at his depot gates on the cessation of work at mid-day or evening (often in heavy rain) with his cheery smile and a recognition for all. It was *his* depot and they were *his* men and how proud he was of them and they of him.

He was taken seriously ill on Friday, January 28, and passed away 20 minutes after his depot had begun work on February 1.

He was buried with full R.A.F. honours in Ickenham Churchyard and, in accordance with his wish, within sight of his depot which he loved so much. No greater visible tribute could have been paid to such a leader as at that sad farewell.

Behind the Service personnel followed in formation of fours the entire staff of the depot—some hundreds of civilians—to the church and grave-side. The whole depot being closed for one hour.

"Tommy" Lyons has gone but his memory lives, and so long as that memory lives and his examples emulated, the R.A.F. shoud be proud that Providence singled out the R.A.F. to be chosen to receive such a man with such an example of loyalty and ability.

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British Empire League and Aviation

Sir Henry Page Croft, M.P., presided over a meeting of the Imperial Communications Committee of the British Empire League at the House of Commons on March 22, when the following resolution was unanimously adopted: "That this committee notes with satisfaction the recent references of the Minister for Air in regard to Empire communications, and further hopes that immediate steps will be taken to prepare schemes to lay before the Imperial Conference with a view to linking up all parts of the Empire by airship, aeroplane, and seaplane." This was moved by Commander Burney, M.P., and seconded by Sir Harry Brittain, M.P.

The AIRCRAFT ENGINEER

FLIGHT
ENGINEERING
SECTION

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March 25, 1926

CONTENTS

PAGE
Duralumin. By Leslie Aitchison, D.Met., B.Sc., F.I.C., M.I.A.E. ... 25
Aircraft Performance. By J. D. North, F.R.Ae.Soc. 27
Aeroplane Joints and Fittings. By F. M. Green, M.Inst.,C.E., F.R.Ae.S. 30
Notes on the Ground Operation of Flying Boats. By R. J. Mitchell, Assoc.M.Inst.C.E., A.F.R.Ae.S. 32
Technical Literature 34

OUR CONTRIBUTORS

Dr. Leslie Aitchison will need no introduction to readers of The Aircraft Engineer, his work being already very well known. We are glad to be able to publish this week the first of a series of articles by this distinguished writer on the subject of Duralumin. There can be little doubt that during the next few years more than one firm will turn its attention to Duralumin construction of aircraft, and consequently it is of considerable importance that as much as possible should be known concerning the characteristics, peculiarities, and treatment of this material. In his first article, Dr. Aitchison deals to some extent with the history of the development of Duralumin, but he gives certain information concerning the material after various treatments, and in the article to be published in the April number of The Aircraft Engineer he will refer in more detail to certain technical aspects.

Mr. J. D. North, whose first article appeared last month, continues this week with a further instalment dealing with wing sections in the light of the vortex theory, and next month he will, it is hoped, continue by telling us something about wing proportions, *i.e.*, proceed from the discussion of wings of infinite span to wings of finite span.

Major F. M. Green discusses this week various methods of joining metal parts together, examining such methods of joining as welding, brazing and soldering, and mechanical joints. Although the two former methods have their advantages, Major Green rather favours the mechanical type of joint, in which friction plays an important part, a type of which the firm with which Major Green is associated —Sir W. G. Armstrong-Whitworth Aircraft, Ltd.—has had extensive experience.

Mr. R. J. Mitchell, who is chief engineer and designer to the Super-marine Aviation Works, contributes an article which, if not of a highly technical nature, is of very considerable practical interest, in so far as it deals with the subject of ground operation of flying boats, or in other words with handling trolleys for flying boats. A direct outcome of experience with amphibian gear, the handling trolley is shown to possess many advantages, and to be less likely to damage the hull than is a beaching cradle.

DURALUMIN.

By Leslie Aitchison, D.Met., B.Sc., F.I.C., M.I.A.E.

From the time that the production of aeroplanes and airships commenced it has been necessary to employ metals in a greater or less degree—greater in the case of engines, and (in the past) lesser in the structures. In consequence of various circumstances, the use of metals in machines is now very rapidly increasing, and there appears to be some likehood that we have seen the last of wood as a primary material of aeronautical construction. For the purpose of flight, it is obvious that the first thought which will come into the mind of the aircraft engineer about any material is its lightness. Timber has its disadvantages, but it has the supreme merit of being a light material, and one of the earliest problems in metal construction was that of rivalling the wooden structure in weight, whilst preserving the requisite strength and stiffness in the resulting design. This being so, attention was naturally turned to the light metals, and by various reasons this was narrowed down to those deriving from aluminium.

Aluminium in the commercially pure form is an excellent material for certain purposes, but, like most pure metals, it has a very low tensile strength and is too soft to serve many useful engineering purposes. The same things can be said of commercially pure iron or copper, and a large proportion of the whole history of engineering could be written round the developments that have taken place in metallurgy in order to overcome these inherent disadvantages of relatively pure metals. The development of the copper alloys, particularly the brasses and bronzes, took place so far back in the history of metals that one is almost faced with the same problem regarding copper and bronze as to know whether the hen or the egg came first.

With iron the process has been more easy to trace, and, of course, the greatest advances have taken place during the last hundred years—that is, since the manufacture of steel in large masses on a commercial basis became firmly established. The ferrous metallurgist has been adding constantly to the number of useful steels. He has been increasing the hardness or the strength or the toughness, or the capacity to resist the effect of corrosive media, or the capacity to retain at high temperatures a large proportion of strength and hardness properties, impelled forward all the time by the ever-increasing demands of the engineer.

The commercial production of aluminium on a large scale almost synchronised with the period of the most intense development of the alloy steels. At that time there did not appear to be any conspicuous need for aluminium as an engineering material, and it appeared likely that the metal would be side-tracked into domestic fields and only touch serious engineering in connection with certain branches of electrical work. Even so, it is interesting to note that certain acute minds had already been struck by the possibilities even of aluminium, and some of us remember well the sensation that was caused by the public utterance of Prof. Arnold, one of the staunchest champions of steel, who suggested about 1908 that the age of steel was passing and that of aluminium was commencing. There may be more in this statement than was obvious in 1908, and is even obvious to-day, but it may be surmised with a good deal of certainty that pure aluminium is scarcely the material to bring about the downfall of steel.

Aluminium, although a light metal, is not strong, and for serious engineering purposes is of very little value (excluding those fields in which a high electrical conductivity is of value). If aluminium in its pure state was the only available light metal, the position respecting light metals would be somewhat analogous to that which would occur if alloy steels were entirely unknown and the only known ferrous materials were cast iron and wrought iron. Metallurgical history, of course, repeats itself, and as soon as aluminium became a regular commercial commodity, obtainable in adequate quantities at a reasonable price, strong efforts were made to develop alloys from it which would be able to play the same part in relation to aluminium that the alloy steels play to wrought iron. It is natural that investigations of this kind should have been carried out from many starting points and with a variety of intentions, and we know now that the German Government were very early active in the direction of developing alloys of aluminium for war purposes. In this country, and in most countries, alloys of aluminium with copper and zinc were developed for the manufacture of castings, and certain progress had been attained when the war broke out. The tremendous requirements of aircraft in the Great War resulted in an intensified attack upon the development of these alloys, and during the war the casting alloys were put upon a very sound basis.

Many years before the war, however, Wilm in Germany had been experimenting upon the production of an alloy of aluminium which would be capable of developing a high tensile strength, and, at the same time, be entirely suitable for working into shapes in a way that could not be expected with a casting alloy. In other words, one might say that whilst the cast aluminium alloys were analogous to cast iron, Wilm was endeavouring to develop a material from aluminium that would be analogous to an alloy steel. After a great deal of work, Wilm discovered the very important phenomenon which is now known as age hardening, and as a result of his work, established the fact that certain types of aluminium alloys, particularly those containing magnesium, were susceptible to a process of heat treatment. The development of these alloys did not come all of a sudden, but by the year 1909, or thereabouts, the development had proceeded sufficiently far for the alloy, which has ever since been known as Duralumin, to be fairly definitely standardised as regards composition and treatment. The discovery of Duralumin, of course, was a very considerable achievement, and it is highly significant that although nearly 18 years have elapsed since Wilm's work, no light alloy has since been developed which possesses the same combination of valuable properties, namely a low specific gravity, high tensile strength and adequate ductility, and a capacity for being worked into practically any of the forms in which wrought metals are required, as occur in Duralumin. Various other alloys have been worked upon and developed, but so far, none of them have reached the stage of being technically the competitor of Duralumin. The result is that, whereas the number of cast aluminium alloys is exceedingly great, there is really only one wrought alloy of aluminium that has to be reckoned with seriously.

Duralumin is an alloy of aluminium, and the chemical composition of the material as set forth in the British Engineering Standards Association Specification is as follows:—

Copper	3·5 to 4·5 per cent.
Manganese	0·40 to 0·70 per cent.
Magnesium	0·40 to 0·70 per cent.
Aluminium	the remainder.

It is evident that the material is composed very largely of aluminium, and, as a result, the specific gravity of the alloy is not very far removed from that of the pure metal itself. Pure aluminium has a specific gravity of about 2·70, whilst the specific gravity of Duralumin is about 2·80. This specific gravity of Duralumin makes the alloy conspicuous, even amongst the aluminium alloys, as most of the useful casting alloys have a specific gravity greater than 2·92. Duralumin is never used in the cast state. There is no particular reason, however, why it should not be used as castings if anybody wishes so to use it. The alloy is very particularly a wrought alloy, and it is after working that it responds most readily to those processes of heat-treatment that are employed to develop the high physical properties of the metal. In the cast condition, the material would require a very much longer time of treatment, in order to produce the necessary structural changes which result in the high strength. This, of course, is primarily due to the relative coarseness of the crystalline macro structure of a casting as compared with that of a forged metal, and the time required to bring about diffusion and the like changes in a cast metal is always very much greater than that required by a wrought metal, simply because of the finer structures of the latter material. In the non-heat-treated condition, Duralumin castings are very little superior to castings made in the ordinary aluminium casting alloys. After working and heat-treating there is no comparison whatever between the properties of the two.

When Duralumin has been worked into the various wrought forms, such as sheet, strip, tube, rod, or drop forgings, or wire, it has to be submitted to a process of heat-treatment, in order to develop its optimum properties. Essentially, this process of heat-treatment consists of two stages. The first stage is that of heating the material to a certain definite temperature, at which definite structural changes take place within the alloy. With a view to retaining this "high-temperature" structure as completely as possible, the alloy is then cooled down to atmospheric temperatures as rapidly as possible. In this respect the heat-treatment of Duralumin is exactly similar to that of steel, and the process of heating to a predetermined temperature, followed by rapid cooling, is carried out with Duralumin for the same reasons as apply to steel. The second stage of the operations in the treatment of Duralumin has no obvious counterpart in the treatment of steel. Duralumin after it has been rapidly cooled, is set on one side and allowed to age. After the material has stood for a period of, say, four days, the heat-treatment process can be considered to have come practically to an end, and it is at the conclusion of this period of age-hardening that Duralumin has developed its full mechanical properties. Age hardening in steel does not occur in any comparable manner, and although there may be some similarities in the structural changes which occur during the age-hardening of Duralumin and those which occur in steel, in order to produce the hardness of a quenched material, it is fairly certain that the changes in the ferrous materials take place exceedingly rapidly, and, in fact, mostly occur during the actual period of cooling. In Duralumin the changes occur over a period of time.

The alterations of mechanical properties that are produced in Duralumin by various kinds of heat-treatment can best be illustrated by means of test figures. In the first place, the influence of re-heating to various temperatures should be shown. This can be demonstrated first of all by taking a specimen which has already been subjected to the complete heat-treatment process, and, secondly, by considering a sample that has not been so treated initially but has been annealed, a process which in itself will be considered later. It is desirable to indicate also the different effect of altering the method of cooling from these various high temperatures. Two methods only need be considered, namely, cooling slowly and quenching in cold water. Four series of test values, therefore, are required, namely:—

1. Heat-treated Duralumin re-heated to various temperatures and cooled slowly (*see* Table 1).

Major Franco's Choice!

for his wonderful flight from Spain to South America, when he covered 6259 miles in 60 flying hours, was the famous NAPIER "Lion."

> *"In a conversation the Duque de Estremera of the R.A.C. of Spain said . . . . the British engines used were perfect. Major Franco had full liberty to choose whatever he preferred, and chose the Napier 'Lion,' and the success of the flight was a tribute also to British motors."*
>
> *MORNING POST, 12.2.26*

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2. Heat-treated Duralumin re-heated to various temperatures and quenched in water (*see* Table 2).
3. Annealed Duralumin re-heated to various temperatures and cooled slowly (*see* Table 3).
4. Annealed Duralumin re-heated to various temperatures and quenched in water (*see* Table 4).

The test values obtained from the metal after these various treatments are shown in the following tables. In all cases, the metal was allowed to stand for a week between the treatment and the test.

Table 1.

Reheating Temperature ° C.	Maximum Stress tons/sq. inch.
100	26
200	26
300	19
400	16
450	18
500	19

Table 2.

Reheating Temperature ° C.	Maximum Stress tons/sq. inch.
100	26
200	26
300	19
400	19
450	22
500	26

Table 3.

Reheating Temperature ° C.	Maximum Stress tons/sq. inch.
100	16
200	16
300	16
400	16
450	18
500	19

Table 4.

Reheating Temperature ° C.	Maximum Stress tons/sq. inch.
100	16
200	16
300	16
400	19
450	22
500	26

The values given indicate the nett result produced by both quenching and ageing. To separate these effects, it is necessary to make different tests—after quenching and before ageing—and to compare these with those given above. Actually, it is only necessary to show the results of ageing on the specimens cooled rapidly and a series of values corresponding to the conditions shown in Table 2 and Table 4 are given in Tables 5 and 6, these last two representing the quenched specimens before ageing.

Table 5.

Quenching Temperature ° C.	Maximum Stress tons/sq. inch.
100	26
200	26
300	19
400	16
450	16
500	17

Table 6.

Quenching Temperature ° C.	Maximum Stress tons/sq. inch.
100	16
200	16
300	16
400	16
450	16
500	17

(*To be continued.*)

AIRCRAFT PERFORMANCE.

Wing Sections in the Light of the Vortex Theory.

By J. D. North, F.R.Ae.Soc.

(*Continued from p.* 15).

The aeronautical engineer, by the use of experimental data provided by wind channels or by analysis of observations made on aeroplanes in flight, is able to bring the problem of aeroplane performance within the domain of rigid dynamics. To dispense with empiricism and attack problems of this nature by the study of fluid motion has been, and still is, the aim of numerous applied mathematicians. Classical hydrodynamics do not go far in dealing with real problems in actual fluids possessing viscosity and compressibility, and although some progress is being made in this direction the most immediate application of fluid dynamic theory to aeronautics is by the analytical study of motions in an artificial "ideal" medium, incompressible and inviscid. Steady motion of such a fluid can be analysed into that due to a series of sinks and sources together with translational and cyclic motion, just as any series of periodic motions can be more or less approximated as the compounding of series of simple harmonic motions. Even in two-dimensional motion the algebraic analysis is complicated so that it is difficult for the engineer to follow its physical meaning. The graphical synthesis of the elementary motions is, however, easily followed, particularly in simpler cases, and many analogies in elasticity and electromagnetism are easily recognised. Appropriate combinations of sinks and sources with translation motion added give rise to "closed" circuits of stream lines in a stream locally curved and these "closed" circuits may be replaced by a solid body just enveloping them, the external stream lines representing flow past such a body. The term "circuit" has been used to imply closed streamlines analogous to the closed whorls of a finger print, *not* to imply cyclic motion. The streamlines of the elementary systems can be easily constructed (*see* for example Lamb's Hydrodynamics), and the

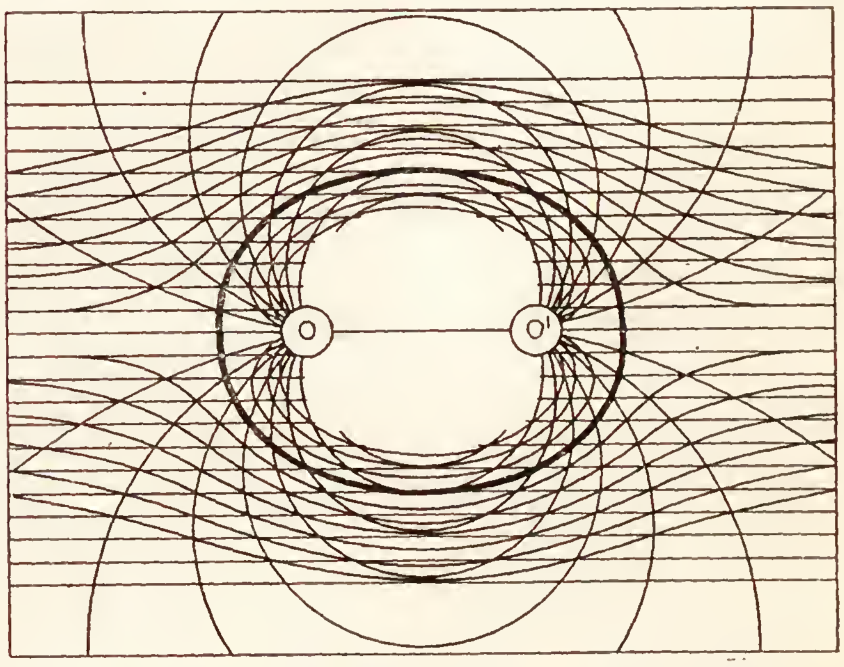

Fig. 3. This figure has been constructed from Fig. 180, page 352, of Bairstow's "Applied Aerodynamics," but the lines have been made symmetrical by repeating them above the line of symmetry.

resulting combined streamlines constructed just as resultant velocities can be graphically determined.

From Bernouilli's equation (*see* Lamb's Hydrodynamics p. 21), it can be shown that the total head at any point of a streamline is constant.

Algebraically,

$$P + \tfrac{1}{2}\rho V^2 = \text{a constant, where}$$

$P =$ pressure $\rho =$ fluid density $V =$ velocity.

It will be remembered that we are dealing with an incompressible fluid so that density is independent of pressure. It is plain that this introduces a very important limitation to the possible velocities if flow is to be conformable. By conformable is meant conforming to the shape of the body. As the velocity along the streamline rises, the pressure necessarily falls, and should the velocity rise to such a figure that the pressure to satisfy Bernouilli's equation would have to fall by an amount greater than the initial fluid pressure, an absolute negative pressure would be required to maintain conformable flow. A negative pressure is plainly impossible in an incompressible fluid hence such phenomena as cavitation in water. It will also be obvious that the application of analyses for the "ideal" (*i.e.* incompressible, inviscid) medium will only apply to air if the actual compressibility effects in air are negligible, or in other words, if the pressure changes are only such as to produce a negligible change of density. We shall have to return to this point in a later article in discussing high speed phenomena such as are found with fast running large diameter propellers. For the moment, however, it is sufficient to emphasise the importance of gradual changes of curvature to avoid giving rise to high velocities where there are violent changes of curvature. The potential or pressure system normal to the streamlines can equally be plotted and where the flow is conformable to a body it will be found that the pressures on the body will balance out—the body will be in equilibrium.

If the fluid were viscous (sticky)—capable of giving rise to forces tangential to the surface of the body—the simple introduction of the body for the "closed" circuit streamlines would be impossible. There must now be a finite velocity gradient between the surface of the body and the external streamlines. This boundary layer is known to be extremely thin and to effect a negligible change in the external stream lines around the greater part of the body. An idea of what happens in this boundary layer may be gathered by imagining the layer represented by a thin layer of dough placed between the palms of the two hands. Now, if the hands be moved relatively to one another, *e.g.*, one forwards and the other backwards, the dough will roll up into a number of rollers. I have not tried this experiment, and I cannot guarantee its success in practice; it presents, nevertheless, a good picture of the relative movement of the sticky air and the body rolling up the air in the boundary layer. A somewhat similar phenomenon can be seen in the rollers forming in shoal water due to the friction between the water and the sand. The energy of these rollers has to be accounted for, and the force associated with its production is usually known as skin friction, and one is forced to the conclusion that very little else is known about it. Various expressions based on experiment are extant which purport to assess this form in terms of length and velocity. Velocity in this instance is the mean velocity of the total stream, or alternatively the velocity of the body through still air. The most popular of these is Zahm's. I do not give the form of the expression as it does not appear to me to represent anything but an empirical formula for the actual experimental forms used within a limited velocity range. An infinitely thin lamina is unfortunately not a practicable possibility; consequently, all such experiments are obscured by "form" resistance. Even if it were practicable, so far as I know—and I am quite open to correction—it remains to be demonstrated that an expression containing only the above variables is applicable to any form of body, particularly in the presence of cyclic flow.*

When the streamlines meet a body they must diverge, and after passing round the body must meet again. If the condition of continuous curvature is to be maintained it is plain that the divergence and the closure must be cusplike. If the presentation of the body is to be changed under flight conditions (change of incidence), there must be movement of the forward stagnation point. This demands the removal of the forward cusp in favour of a rounded nose of curvature gradually increasing towards the normal stagnation point. Very little can be done with the movement of the aft stagnation point. For obvious reasons, the back cannot be so rounded as to make any appreciable difference to the high velocities in the trailing edge region, the prime cause of the breakdown of conformable flow as change from normal presentation takes place. If we leave the body as it now is, the familiar Joukowsky streamline form will be easily recognised. The cusped rear end is, however, a practical nuisance—in fact, anything but an approximation is almost a practical impossibility. Fortunately, experimental evidence such as the tests on wing forms, airship bodies and the like, indicate that within reason the closure of the trailing part of the body at a finite angle has a negligible effect on the resistance. There are two possible explanations for this: firstly, towards the end of the cusp the pressures are so nearly normal to the stream that their component resistance parallel to the stream is a very small part of the total pressure over this part of the body. A second possible additional explanation is that the cumulative effect of the boundary layer rollers tends to cause the streamlines to break away just before the end of the tail is reached, this region shedding a periodic stream of eddies whose energy is partly (mainly ?) derived from the boundary layer rollers. Pictures of such flow (ref. Bairstow's Applied Aerodynamics, p. 349) shows this phenomenon for bodies with finite trailing edges (Figs. 174 and 175.) I have not seen experimental flow patterns for Joukowsky cusped forms, but if the difference of resistance is negligible, it is hard to believe that similar non-conformable flow and eddy-making would not be present at the tail. As a natural consequence, it would follow that the form of the tail in the non-conforming region was of minor importance, or even that it could be cut off altogether. Some struts which had been so mutilated were included in a series tested at the National Physical Laboratory in 1912, at the instance of Mr. Alec Ogilvie (a full description was published in the issue of FLIGHT, for June 15, 1912). The results were very favourable. Unfortunately, these tests were carried out at fairly low Vl (though Vl = 2·5 is well towards a stable type of flow.) I do not know of any further experiments in this direction, although owing to certain practical advantages I used this form for interplane struts and for fuselages on several machines about this period. The full scale evidence (of course, largely negative and of doubtful qualitative value) did not indicate that at higher values of Vl the favourable resistance coefficient was not realised. In addition, some experiments on aerofoils carried out at the Royal Aircraft Establishment (see R. & M. 928) indicate that blunting the trailing edge of wing sections does not sensibly increase their resistance, whilst a more extensive and systematic series of experiments carried out by Boulton & Paul, Ltd., in their wind channel at Norwich at Vl = 30 seems to show that truncation can be carried to considerable lengths with slight effect on aerodynamic properties. It does not, of course, follow that these suggestions are valid at speeds where compressibility becomes important. Nearly all readers will, I think, understand that the term "bodies," which I have used from time to time in this article does not refer to aeroplane bodies in particular, but to any solid object placed in the stream of flow. I have referred to a change in attitude as affecting the flow round bodies, but made no mention of lift. In fact, the types of flow discussed do not give rise to lift and conformable flow in the "ideal" fluid could not cause lift. It must now be imagined that the figures represent a section of a wing of infinite span and the flow around it. As the span is infinite, every section normal to the span will have the same flow pattern. If we consider a wing section and plot the streamlines in an "ideal" fluid by the sink and source and translational method (the complexity of the actual process may be gathered from Taylor's paper to the Institute of Naval Architects, quoted on p. 351 of Bairstow's Applied Aerodynamics) the resulting flow is as in Fig. 4 (shown by the full lines AA). Experimentally, also see Fig. 178 in Bairstow's "Applied Aerodynamics," demonstrated by Hele Shaw's flow pattern machine. For a demonstration of this method and references to Stokes' correlation of "super-viscous" and non-viscous flow, see Chapter VII. *ibid.*

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* It is perhaps as well to mention that this somewhat crude attempt at picturing certain aerodynamic phenomena is part of a series of articles on performance and that fuller or more accurate representation would be out of place. Reference should be made to Lanchester's "Aerodynamics" and "The Flying Machine", Proceedings—Institute Automobile Engineers, 1915 (separately published) and particularly to Bairstow's paper "Skin Friction and the subsequent discussion—Journal R. Aë. Soc. January 1925".

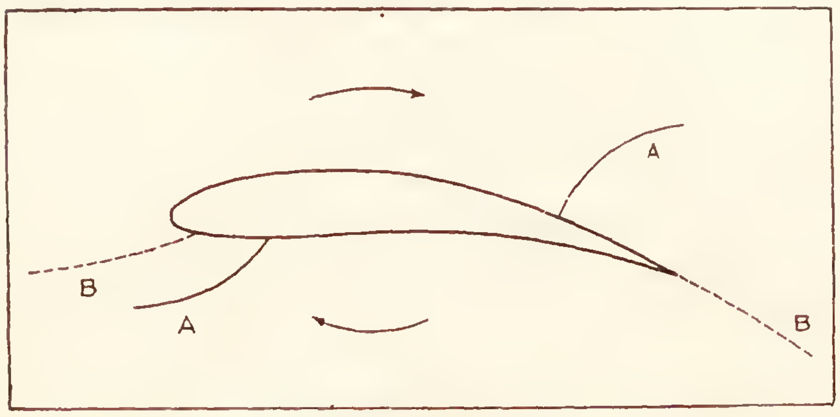


Fig. 4.

The type of flow A A would lead to impossibly high velocities at the leading and trailing edges, and can only be made conformable by moving the stagnation points, as indicated by the dotted lines. This can be achieved by adding cyclic flow in the direction shown by the arrow. By cyclic flow is meant motion round a filament, the velocity being inversely proportional to the distance from the core (the analogy with a sink or source by the interchange of flux and potential may be noted).

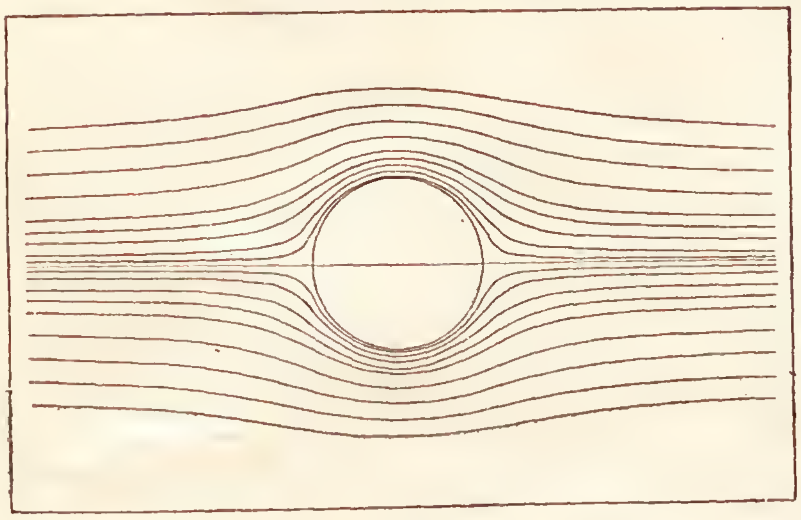


Fig. 5.

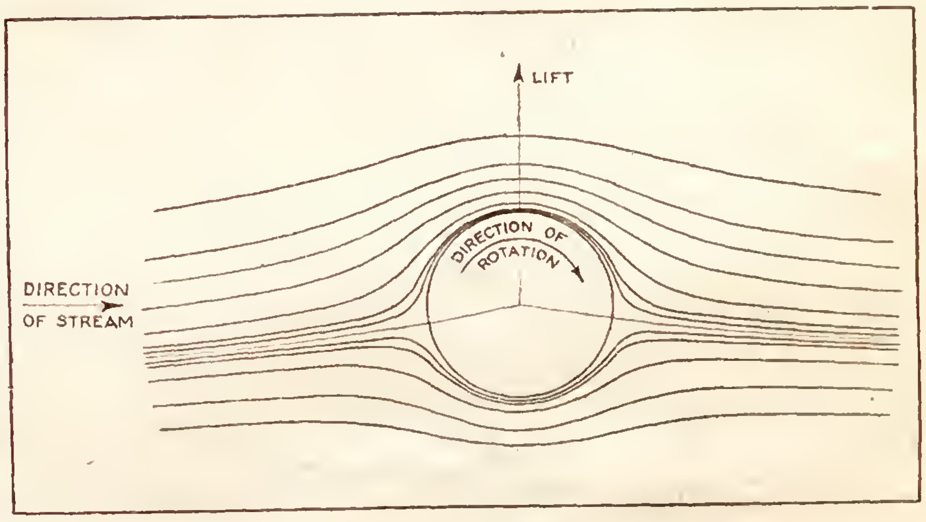


Fig. 6.

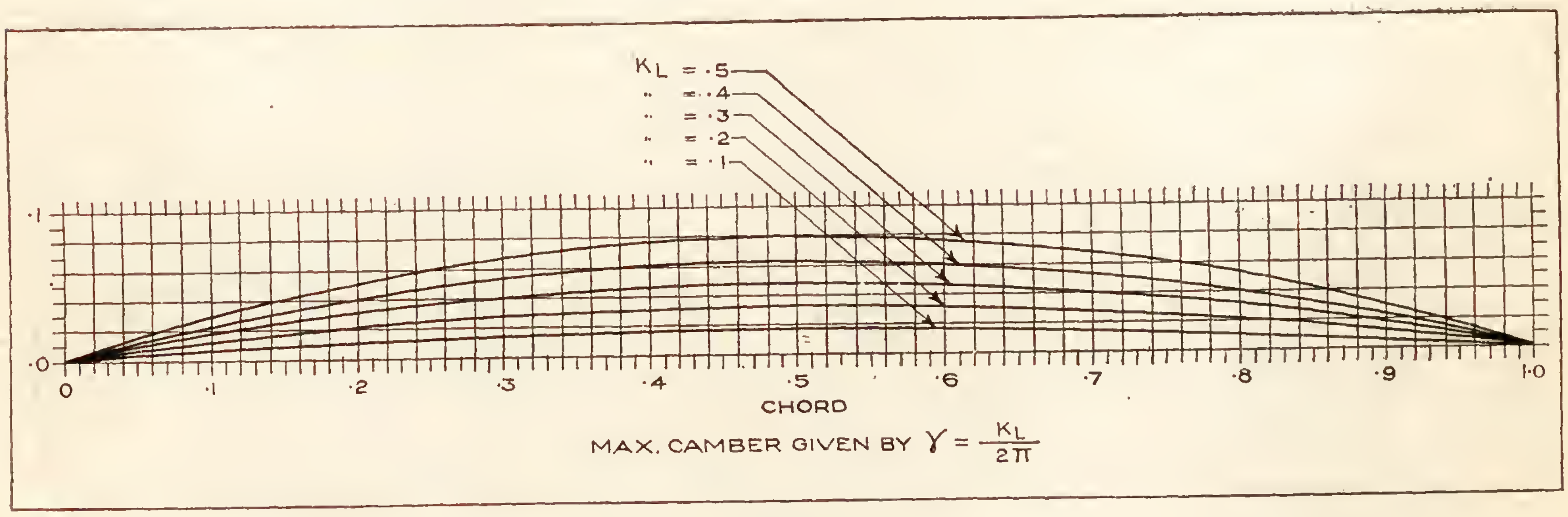


Fig. 7.

The influence of cyclic flow on the flow pattern round a cylinder in a uniformly moving stream can be seen from Figs. 5 and 6, which have been taken from A. R. Low's paper on "The Circulation Theory of Lift," read at the International Air Congress, London, 1923. If the stream is taken to be flowing from left to right the cyclic flow in Fig. 6 is clockwise. Accordingly, the velocity in the stream-lines will be *increased* on the top of the cylinder, *decreased* on the bottom. From Bernouilli's equation the pressure normal to the streamlines will be diminished on the top and increased on the bottom, causing a force in the direction of the arrow (lift). It should be, perhaps, made clear that the terms p and $\frac{1}{2}\rho V^2$ in Bernouilli's equation are the static and dynamic pressures respectively. The static pressure is normal to the streamlines, and the dynamic is the "face" pressure in the streamline. Where the flow past a point is zero, as at the front stagnation-point, the dynamic pressure $\frac{1}{2}\rho V^2$ acts normal to the surface at this point. One may compare the action of the dynamic and static heads of an air-speed indicator.

Everyone will have recognised that we have here the Flettner rotor. The cyclic flow can only be communicated to the fluid by virtue of viscosity, and there will, of course, be a boundary layer with rollers. It can be shown that the compounding of cyclic flow round an infinitely small filament and translational motion gives rise to a force (lift) at right angles to the direction of motion proportional to the strength of the cyclic flow and the velocity. As this force is at right angles to the direction of motion, there is no energy communicated to the stream and *there is no resistance.* The resistance comes from the imperfectly conformable flow and the eddy making, including the boundary layer rollers. The streamline flow round a cylinder can be determined from a sink-and-source system, and, assuming that the boundary layer is negligibly thin, the whole flow and pressure system can be calculated for any cyclic flow (or circulation, as we may now call it) and any velocity, provided that the flow is approximately conformable.

An interesting reference to Kelvin and Tate on analogous results on spinning tennis and golf balls may be found in the paper by A. R. Low already quoted. In this paper the graphical constructions now referred to are plainly set out, and those interested should study this valuable paper.

The remarks which applied to the Flettner rotor apply to the wing section; certain strengths of circulation can be shown to be appropriate to the aerofoil, and the flow and pressure systems studied. There is only one circulation to give conformable flow for each aerofoil, and in the viscid medium (air) the flow is not perfectly conformable. The minimum loss in eddy-making from boundary surface rollers, non-conformation at the tail, etc., occurs at that circulation which would give conformable flow in the ideal medium. It will be understood that circulation is only a relative term for the cyclic component added to the flow pattern, and that it results in a general curvature of the whole flow. The curvatures at the centre line of the wing section corresponding to various circulations are shown in Fig. 7, the circulations being expressed as lift coefficients.

We are now in a position to make a great simplification. It has been demonstrated experimentally that the phenomena of lift and centre of pressure movement are, for thin wing sections (*e.g.*, thickness not more than 0·125 of the cord), sensibly independent of the profile provided that it is of good streamline form and within the limits of circulation (or K_1 or incidence, whichever way you prefer to look at it) within which the flow is reasonably conformable. In other words, that the phenomena may be referred to the shape of the centre line of the aerofoil (*see* R. & M. 910). This plainly has tremendous practical advantages; we can choose or construct by appropriate transformation streamline forms to contain the necessary wing structure and control the K_1 at which minimum profile drag will occur, and the movements of the centre of pressure within reason. Although the theory only holds good conformably, we shall see that a process of inspection will give valuable guide to probable values of maximum lift coefficients, and a limited amount of systematic experimentation will provide data from which a reasonably accurate estimate may be made of profile drag, and its variations from the minimum at most conformable flow.

It must not be forgotten that all this time we are discussing a wing of infinite span, but the adjustments on account of practical span limitations do not invalidate these conclusions.

(*To be continued.*)

AEROPLANE JOINTS AND FITTINGS.

By F. M. GREEN, M.Inst.C.E., F.R.Ae.S.

The best method of fastening things together is a problem in all branches of engineering. A chain is only as strong as its weakest link. We must see to it that the weakest link is very little weaker than the strongest, otherwise the chain will be heavier than it need be. In the structure of an aeroplane weight is, and always will be, one of the most important factors, and for this reason designers of aeroplanes spend far more time and thought in the scheming and designing of joints and fittings than almost anyone imagines.

In the making of wooden aeroplanes many methods are used in the jointing of the wings and fuselage. The peculiar difficulties of using wood have been largely overcome, but there is always the problem of providing enough bearing area to prevent the joints working and the structure becoming gradually less rigid. Trouble is always likely to be caused by the shrinkage of the wood and by the deterioration of the glue that seems to be a necessity in wooden construction. It is not proposed to deal with the various types of joints and fittings that have been designed for wooden aeroplanes. The purpose of this article is to discuss methods of joining together metal structures which, in most people's opinion, are bound to displace wooden structures in the near future.

The methods of fastening two pieces of metal together can be divided into three classes:—

(1) Welding by acetylene blow-pipe, or by various electrical methods.
(2) By brazing, silver-soldering, or soft soldering.
(3) Mechanical joints, *e.g.*, by bolting and riveting.

All of these methods have their advocates, and all of them possess their advantages and disadvantages. It will be useful to state the pros and cons of each system before giving the writer's reasons for the use of the system which he prefers.

1. Welding.

If it were possible to join two pieces of metal together by the application of heat and pressure in such a way that the internal structure of the material remains unchanged, and if it were also possible to do this without distorting the external structure, then welding would offer great advantages. Unfortunately the metals that can usefully be used in aeroplane construction do not fulfil these conditions. The structure of steel and of the light aluminium alloys is a complex arrangement of crystals and binding matter, which is all too easily altered by the application of heat. The only

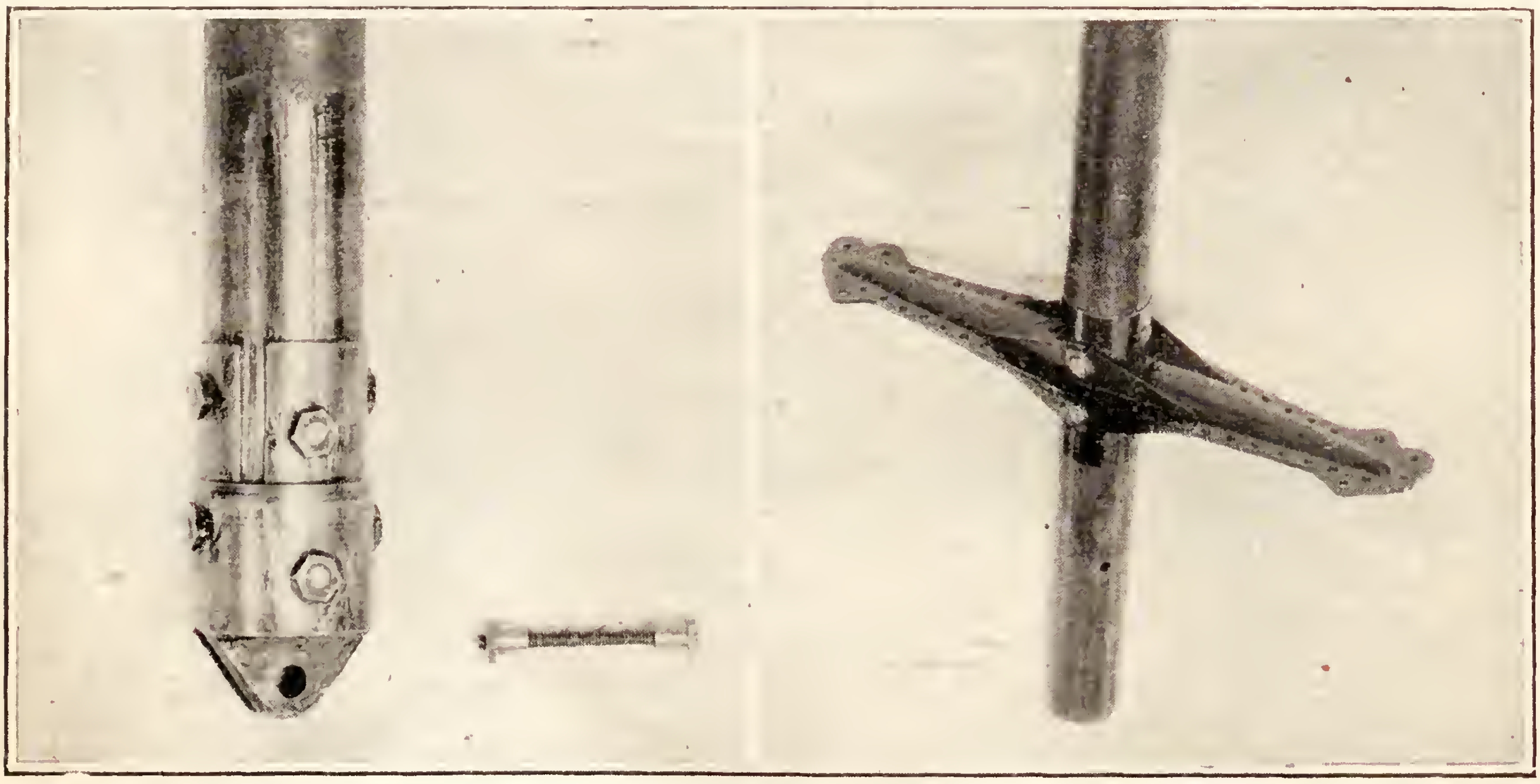


Fig. 1 (on left) shows a typical mechanical joint, in which fastening is by collar nuts and screwed tie-rods. Fig. 2 (right), shows rudder lever made up by riveting.

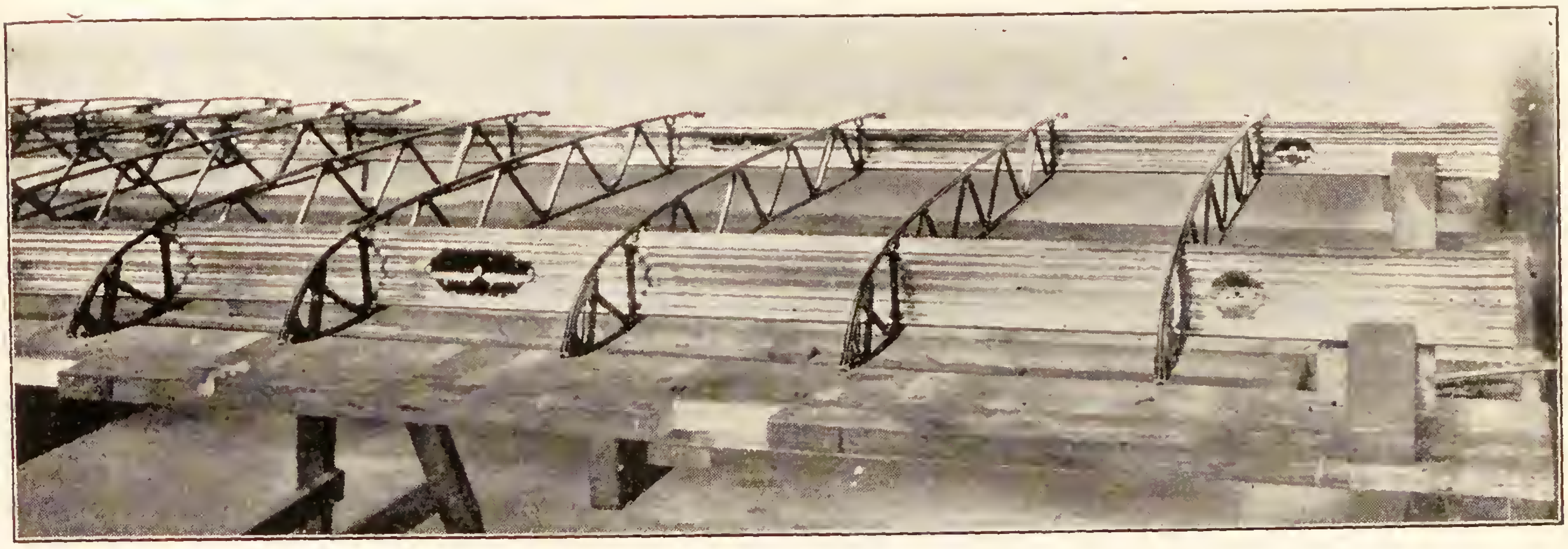


Fig. 3. Wing assembly of Armstrong-Whitworth metal wing. In this view the leading edge has not yet been clipped on.

material that can be welded with a reasonable certainty of uniform results is a low carbon steel which has low specific strength, and even when using this material one can only depend upon a tensile strength of about 16 tons to the square inch at the joint. It is true that in America frames are being made of alloy steel welded together electrically, but it seems very doubtful whether we can depend upon 100 per cent. of good joints, and also whether the material round about the weld would be in a satisfactory condition.

The advantage of using acetylene welding is that with a comparatively small selection of tube and sheet it is possible to make up a variety of joints without much preparation in the drawing office and with a minimum number of machined parts. With skilled welders repairs can be made with very little material. It is on record that one well-known designer of aeroplanes who uses a welded steel frame decided that a new design was lacking in stability, and that without more ado he had the frame sawn in half, a new bay welded in, and the aeroplane was flying again the next day.

It is frequently contended that the use of acetylene welding will cheapen manufacture. In small quantities this is probably correct, because the proportion of drawings, machined parts, press tools, and so forth that are required for frames or other constructions involve a large additional expenditure. At the same time the writer is quite sure that for quantity manufacture the use of welded fittings is a serious disadvantage. Apart from the cost of the welding operations, the accuracy of the welded parts is never likely to be great enough to make jig assembly possible, and all our experience goes to show that it is only by making interchangeable parts that can be assembled with the minimum of labour that economic production is assured. It is the writer's opinion that while a welded steel frame is probably better than a wooden frame it is much heavier than it need be on account of the low strength of the materials used; that there will always be some uncertainty as to the welding, whether it is done by acetylene blowpipe or by an electrical method; and finally, that the frame in quantities will be more costly to produce than one which is jointed together by mechanical means.

2. Brazing and Soldering

have much the same disadvantages as welding, but as the temperatures that are used are lower the harmful effect is somewhat less. The writer has used steel metal fittings joined together by dip brazing, and when these have been made of mild steel the results are satisfactory. It is possible to use higher tensile steels and to heat-treat after brazing, but there is a tendency for the brass to penetrate the higher tensile steels and cause brittleness, which frequently leads to cracks. The process of dip brazing, in which the part to be brazed is plunged into a molten bath of brazing metal, is much to be preferred to hearth brazing, as temperature control is easier and the whole job is cleaner and more reliable. The objection to the method is that there is a great deal of cleaning up to do after brazing, and this is very much more costly than might be expected. It is particularly difficult to clean the brazing metal out of a hole, as the metal itself is generally too thin to allow of a machining operation.

It is not possible to braze together a complete frame without the use of sockets, and it is scarcely advisable to braze with sockets, as this makes it difficult to use high tensile steels for the tubes of the frame-work. It is of course common practice with bicycle frames, but only the mildest of steel tube is generally used.

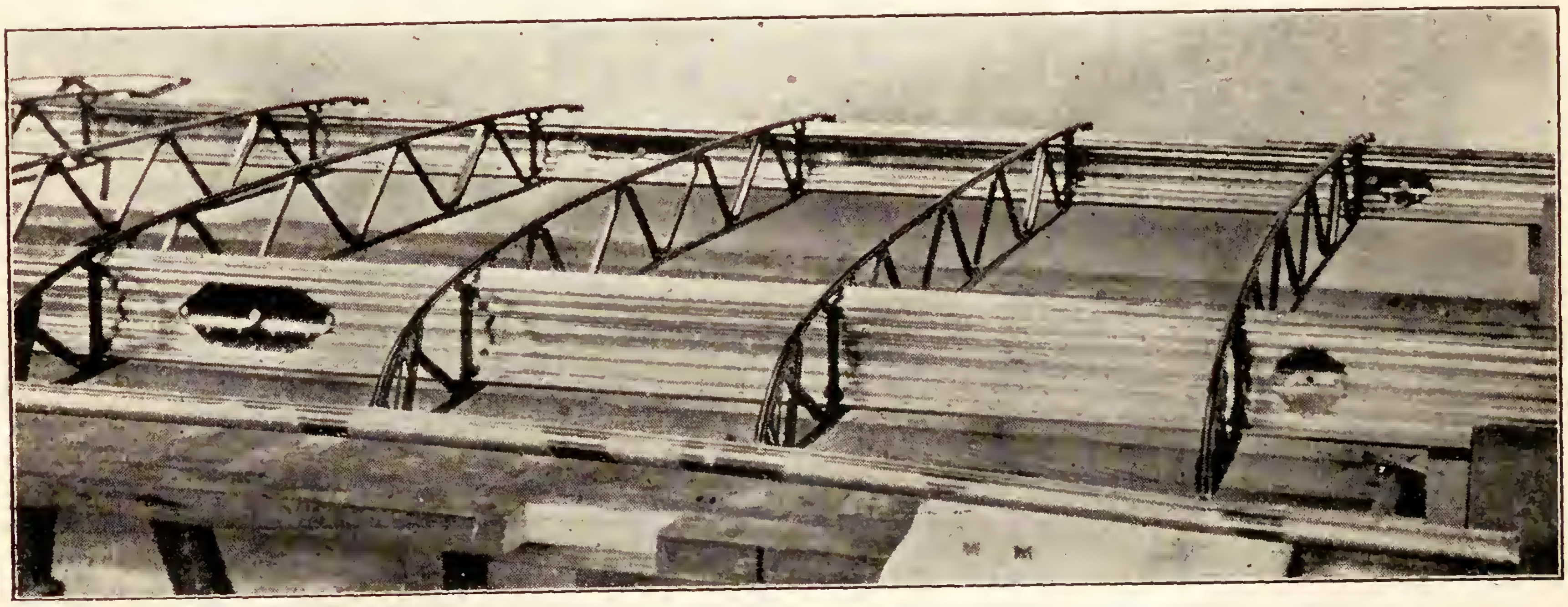


Fig. 4. Leading edge in place except on the extreme right, where it has not yet been sprung into place.

Silver soldering has much the same disadvantages as brazing, but it is carried out at a somewhat lower temperature, and it makes a very strong job. It is scarcely ever used, partly on account of the cost of the silver solder, but chiefly because ordinary brazing is generally good enough, and the temperature is still not low enough to get away from ill-effects on high tensile steels.

Soldering with low temperature tinman's solder need not affect high tensile tubing, but a good deal of care and supervision is necessary, because it is easily possible to raise the temperature higher than needed. So long as joints made with soft solder are in pure shear, and there is little direct tension or tearing action, soldered joints will stand up to a shear of 2 tons per square inch. It is generally considered advisable to reinforce the joint with taper pins or rivets up to at least two-thirds of the strength of the joint. Sockets built up of sheet metal and dip brazed can be soft soldered on to tubes without difficulty, and the writer has experience of a number of frames built up in this way that have been quite successful. The chief objection to the method is that it is expensive. A great deal of care has to be taken in making each joint, particularly to ensure that it is properly cleaned of flux. If this is not done corrosion is almost certain to start sooner or later.

3. Mechanical Joints.

It was on account of these manufacturing difficulties that the attempt was made to make up a frame which was fastened together entirely without welding, brazing or soldering. The problem is fairly simple if channel or angle sections are used for the frame, but for various reasons it was decided to keep to round steel tube. The difficulty in making a frame that is bolted together is in keeping the joints tight and preventing them from working and fretting the holes. Very accurately fitting bolts would put up the cost of manufacture, while rivets are not convenient for use with tubes. The system which was eventually adopted is illustrated in Fig. 1. The tube itself is reinforced by a sleeve, generally of the same size tube, split lengthways and sprung into place, and the actual fastening is made by using collar nuts fastened together with a screwed tie-rod across the diameter of the tube. Direct tension tests were made of samples joined in this manner, when it was found that the apparent bearing pressure at which the joint failed was about 150 tons to the square inch on the surface of the collar nuts if friction were neglected. As this is a much higher bearing pressure than the metal will take it was obvious that friction could not be neglected, and that it was in fact largely by means of friction that the joint held together. This encouraged us to use the joint on a large scale, and it has been found to be completely successful in a number of steel fuselages in aeroplanes that have been supplied to the Air Force and also in aeroplanes used by the Armstrong Whitworth Reserve Training School. The joints are quite rigid and show no signs of movement after hundreds of hours of flying and thousands of landings.

The advantages of using a purely mechanical joint are many. In the first place, frames can be built up on jigs and the saving of time in erecting and trueing a frame in this way is considerable. The frame is very much more easily repaired, because a member can be easily replaced, and finally there is the big advantage that the tube can be used in its best heat-treated state and there is no fear of spoiling it or rendering it liable to corrosion. Hitherto the writer has only experienced this method as applied to steel tube, but there seems no reason why it should not be used with equal success to fasten light alloy tubes.

Besides the wings and fuselage there are a number of other places in an aeroplane where riveted-up units can be used. It has been common practice to make the levers that work the ailerons, elevator and rudder of a stream-line shape by welding two steel pressings together. An alternative way of making up the same pieces is illustrated in Fig. 2. It will be noted that no welding is used and that the whole construction is riveted together and can be fixed to a tube by means of a ferrule, nuts and tie-rods. A similar lever can be made in aluminium alloy.

There is still another way by which components can be joined together. This has been used extensively in the metal wings made by Sir W. G. Armstrong, Whitworth Aircraft Ltd., and is best understood by referring to the illustrations, Figs. 3 and 4, where the attachment of a rib to the leading edge of the plane is shown. The rib itself is made up complete with an aluminium fitting in each end (Fig. 3). The leading and trailing edge sections are pushed over this, as shown in fig. 4. In order to illustrate the method the leading edge on the right-hand side of the picture has not yet been sprung into place. The leading edge is locked into place by means of two small clips, one on each side of the rib. These clips embrace the lips of the section and are slid up into place close alongside the rim. It has been found in practice that no further locking is necessary.

There are many other types of joints which might be described, but the few illustrations given are intended only to show that mechanical jointing is not necessarily a difficult or costly process. The examples chosen have all been tested out on Service aeroplanes with results that have been perfectly satisfactory, while the economy in manufacturing has been at least up to expectations.

NOTES ON THE GROUND OPERATION OF FLYING-BOATS.

By R. J. MITCHELL, Assoc.M.Inst.C.E., A.F.R.Ae.S.

Sometime in the future the design of flying-boats will have reached a state of development at which they can be moored out for indefinite periods. Even at the present time, modern flying-boats are often moored out for quite long periods, especially when carrying out extended cruises away from their base. It is the usual practice, however, for them to be brought ashore and housed in hangars when not in operation, and no matter what state of development flying-boats reach, it will always be desirable to bring them ashore periodically for inspection, maintenance and repair, just as an ocean liner is dry-docked for its periodic overhaul. It may be argued that large flying-boats may be dry-docked in a similar manner, but it is considered that for the sizes at present being built, and contemplated building, it will be found much more efficient and economical to bring them ashore.

The methods employed in launching, bringing ashore, and handling flying-boats on the ground are of very great importance, and have a very considerable bearing on the length of their useful lives.

The Beach Cradle has generally been used and is still used to a large extent for this purpose. It consists of a cradle, mounted on swivelling wheels, which is made to fit the bottom of the hull amidships for a considerable portion of its length. The beach cradle has been found to have many disadvantages, the chief of which is its liability to damage the hull. It is often stated on very good authority that more damage occurs to flying-boats during the use of beach cradles than during all the remainder of their normal operations.

Some early efforts were made to eliminate the beach cradle by fitting an axle through the hull fitted with external detachable wheels. This was not very successful, however, as the intense localisation of the loads at the axle was found to be very little better for the hulls than the beach cradle, and was liable to cause leakage unless the hulls were strengthened very considerably.

It was not until the development of the boat amphibian that the great advantages of the amphibian type of chassis for launching and beaching were realised, and that by designing a chassis which could be very easily fitted or removed, the advantages could be utilised for flying-boats.

A chassis of this type has been designed and has been extensively used for the operation of the "Southampton" type flying-boats. The accompanying photographs serve to illustrate its general features and method of operation. The chassis is made in two separate parts, one to fit on each side of the hull. Each part consists of a light tubular frame built on to a bent axle carrying an aero wheel. An adjustable strut is pinned to the axle near to the wheel in such a way that it is free to swivel in the plane of the axle through a certain fixed angle. This strut is made in the form of a large turnbuckle with a right- and left-handed screw and is lengthened and shortened by turning the hand wheel in the centre. The buoyancy of the wheels is easily sufficient to keep afloat the whole chassis. Each half of the chassis is attached to the hull at two points, these being the bases of the wing root struts. The inner end of the axle forms one point of attachment and the end of the rear chassis strut, the other attachment. These attachments are made with very slack fitting pins in a horizontal plane, thus enabling the chassis to swing up and down. The upper end of the adjustable strut is attached to the front spar of the lower plane at its point of attachment to the front wing root strut. It will be seen that by lengthening and shortening the adjustable strut by means of its central control wheel the chassis is lowered and raised and swings about its two points of attachment on the hull.

The chassis can be attached to the flying-boat when afloat. This can be done at its moorings by means of a boat, or from the slipway by bringing the flying-boat in to the slipway stern first. The two attachments on the hull are first made. The attachment pins are a very slack fit and the joints have a big lead into their sockets, so that the attachments are very easily made. The chassis will now float so that the upper end of the adjustable strut, which is shortened to its limit, can be conveniently attached to its socket on the lower plane in a similar manner. The adjustable strut is now lengthened and the chassis forced down into its lowest position. By the use of a light tail trolley the flying-boat can now be drawn out of the water and handled on the ground in exactly the same manner as a normal type of land machine.

Owing to the necessity of packing flying-boats as closely as possible in their hangars, in order to economise hangar space, it has been found necessary to be able to move them in any direction, especially sideways, without the usual backward and forward manœuvring. This requirement is analogous to that of motor-cars in a closely-packed garage and can be satisfied in an exactly similar manner by the use of skates with swivelling rollers. The flying-boat can be wheeled on to a pair of these skates, made to fit the chassis wheels, and can then be side-tracked or moved in any direction.

The following are some of the advantages claimed for this type of handling chassis over the beach cradle :—

Liability to Damage Due to Handling.

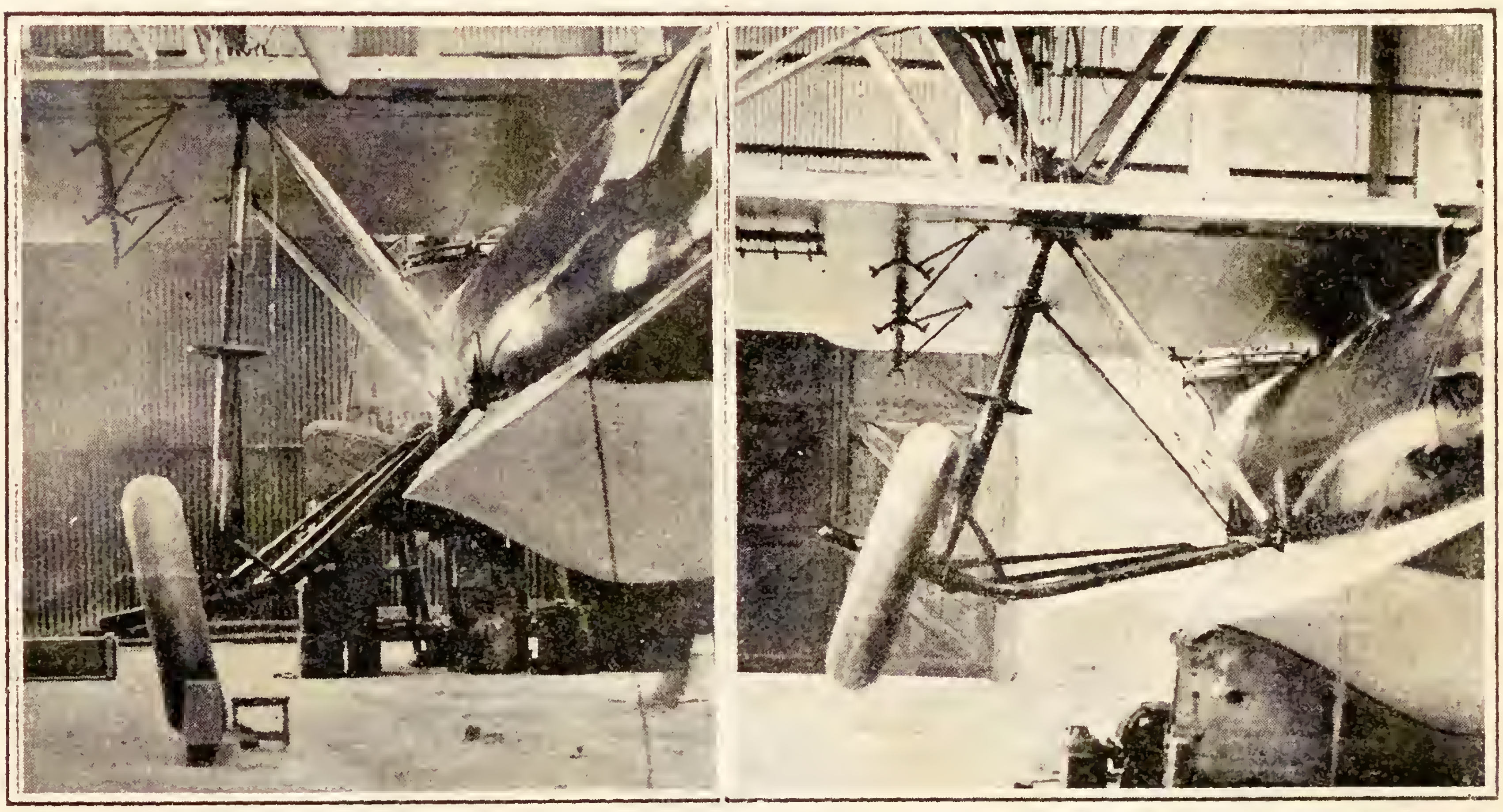
The beach cradle takes the weight of the flying-boat through a portion of the bottom of the hull, and thus places on the hull loads of a different nature from those experienced in other ways. The bottom of the hull forms a very narrow base for support in comparison with the span, and this causes rocking of the flying-boat on its beach cradle during handling, or when resting in even a light breeze. This, in turn, causes "working" of the hull and liability to subsequent leakage.

When launching a flying-boat or bringing it ashore by means of a beach cradle, there occurs a very critical period during which serious damage may very easily be done. This period occurs during the change over from the flying-boat being water borne and cradle borne. If the sea is a little rough, or is affected by the swells from passing steamers, the hull is very liable to be hammered on to its cradle by a series of heavy blows. This usually happens when the cradle is not in its proper place, with the result that the bottom of the hull receives these blows on projecting parts of the cradle.

The handling chassis carries the main weight of the flying-boat from points on the wing structure, and the hull is suspended from these points in a similar manner to when the machine is in the air. The loads due to handling are thus taken through the structure in a manner analogous to the flying loads. No additional strengthening of the hull or structure is, therefore, necessary, and the flying-boat can be roughly handled or left out in the open in rough weather without fear of damage. The use of the handling chassis eliminates the causes of damage attributable to the beach cradle, as when the chassis is attached and lowered into position the flying-boat can alternate between its chassis-borne and water-borne conditions without the least harm.

Ease of Operation.

The operations of launching and bringing ashore by means of a beach cradle require the use of a large crew, specially trained to the job, and who can be relied upon to use great care and very considerable skill.



BEACHING CHASSIS OF SUPERMARINE "SOUTHAMPTON." On the left the chassis is shown in the down position, while on the right it is shown at the top of its travel.

The handling chassis can be used with a considerable saving in personnel and time, and its operation can be made much more of a routine job.

Accessibility of Hull.

When a flying-boat is resting on a beach cradle, a large portion of the bottom of the hull is not available for inspection, repair, painting, etc. To carry out these operations the machine has to be removed from its cradle by jacking up or lifting, a very tedious and precarious job.

Furthermore, this portion of the hull is in more or less constant contact with the padding of the cradle, which is soaked with sea water. This is a matter of vital importance when duralumin hulls are considered as the portion of the hull in contact with the sea water soaked cradle is seriously liable to corrosion, and is not even available for inspection without considerable work.

The handling chassis eliminates all these disadvantages, and leaves all parts of the hull quite accessible.

Transportation.

Beach cradles for large flying-boats are necessarily heavy and cumbersome, and difficulty is experienced in transporting them by rail or boat.

A handling chassis is light and comparatively small, and can be transported without difficulty.

Sphere of Operation.

In spite of its name, the beach cradle can only be used successfully on a slipway, and considerable difficulty would be experienced on the average type of natural beach. The handling chassis has a much larger sphere of operation, and can be used quite efficiently under these circumstances.

The use of the handling chassis for flying-boats may be described as a recent development, and the experience available is not very extensive. There is little doubt that considerable improvement can still be made as our experience increases. There is every indication, however, that the use of the handling chassis will prove a very important step in the efficient and economical operation of flying-boats.

TECHNICAL LITERATURE.

A.R.C. REPORTS.

HIGH-FREQUENCY FATIGUE TESTS

By PROFESSOR C. F. JENKIN, C.B.E.

Work performed for the Engineering Research Board of the Department of Scientific and Industrial Research.

R. and M., No. 982 (M. 30). October, 1925. Price 9*d*. net.

The experiments on high-frequency fatigue in copper, Armco iron, and mild steel described in the following paper were carried out in the Engineering Laboratory, Oxford, at the suggestion of the Elasticity and Fatigue Panel of the Aeronautical Research Committee. The question is of importance to the users of high-speed machinery.

In 1911 Professor B. Hopkinson[*] called attention to the importance of ascertaining whether the fatigue limit of metals was dependent on the rate of alternation of stress. He designed and made an electric alternating direct-stress machine, and published the results of tests on mild steel carried out at about 7,000 periods per minute (116 per sec.), which was more than three times as fast as any tests made up to that time. The results at this speed were compared with those made by Dr. Stanton at the National Physical Laboratory on the same material at 2,000 periods per minute (33 per sec.). Professor Hopkinson considered that the results showed that speed had a marked effect, but he did not consider that his tests were conclusive. In the light of the knowledge gained on fatigue testing since that date neither set of tests can be considered satisfactory.

After a large number of tests using the apparatus rotating at a frequency of 100 periods per second, which was later increased for tests with torsional vibrations at large amplitudes to 5,000 periods, the experiments were ultimately abandoned. The apparatus was found not to be powerful enough to overcome the large hysteresis which appeared as the fatigue limit was closely approached, the power being apparently limited by the magnetic saturation of the iron in the armature. The amount of the strains actually attained in typical experiments were as follows :—

> Test piece made of copper tubes or copper rods, of diameter about $\frac{1}{10}$ in., and the effective length 3 in. ; approximate stress was between 3·3 and 3·7 tons per square inch and the strain 0·0012.

The specimens remained unbroken after upwards of 10^7 periods.

SOME EXPERIMENTS ON A MODEL OF A B.A.T. "BANTAM" AEROPLANE WITH SPECIAL REFERENCE TO SPINNING ACCIDENTS.

PART I.—LONGITUDINAL CONTROL AND ROLLING EXPERIMENTS.

By H. B. IRVING, B.Sc., and A. S. BATSON, B.Sc.

PART II.—EXPERIMENTS ON FORCES AND MOMENTS (INCLUDING RUDDER CONTROL).

By H. C. H. TOWNEND, B.Sc., and T. A. KIRKUP.

R. & M. No. 976 (Ae. 190). November, 1925.
Price 1*s*. 3*d*. net.

The spinning of aeroplanes is a problem which has engaged the attention of the Aeronautical Research Committee on several occasions, and the first report dealing with the subject in much detail is R. & M. 618.[*] The experiments described in the present paper relate to difficulties experienced in coming out of a spin by a certain type of aeroplane which was in other respects a very nice machine to handle.

Non-Rotational Experiments.—Measurement of pitching moment (including elevator control) over a large range of incidence and for angles of yaw up to 40° on the model with standard wing gap (0·81 × chord) and model with gap increased to 1·03 × chord.

Rotational Experiments.—Measurements of auto-rotational speeds and couples were made for the complete model with standard and increased gaps (no yaw), and the auto-rotation of the yawed model measured about an axis through the centre of gravity of the aeroplane (angle of yaw 30° ; original gap) ; pitching and yawing moments due to rolling were also observed (wings only).

Non-Rotational Experiments.—The pitching moments and longitudinal control of the "Bantam" do not appear to possess any unusual features. Sideslip (or yaw) produces a pitching moment tending to increase the angle of incidence ; the magnitude of the moment is similar to that observed in the case of the S.E.5A model. The longitudinal control is practically unaffected by sideslip. Increasing the wing gap by raising the upper plane had very little effect on either pitching moment or longitudinal control.

Rotational Experiments.—The "Bantam" has an abnormally high speed and large range of auto-rotation.

Sideslip corresponding to 30° yaw completely stopped auto-rotation at any angle of incidence, the ailerons being set so as to balance the rolling moment due to sideslip ; raising the upper plane of the model reduced the range and maximum speed of auto-rotation. Pitching moment due to rolling was found to become positive at large angles of incidence, but its magnitude was always small compared with the control available.

The high speed and large range of auto-rotation of the "Bantam" are shown to be easily explainable by the absence of stagger and by the small wing gap of this aeroplane. The results are then discussed with special reference to the problem of difficulty in recovery from a spin, attention being chiefly directed to the various factors affecting the longitudinal trim during a spin.

Effect of Inertia Term.—Attention is drawn to the importance of the inertia term in the equation of pitching moments for the conditions of a spin, particularly when the characteristics of a biplane, *e.g.*, small wing gap combined with zero

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[*] Roy. Soc. Proc., A. Vol. 86. November, 1911.

[*] R. & M. 618. "The Investigation of the Spin of an Aeroplane." By H. Glauert. June, 1919.

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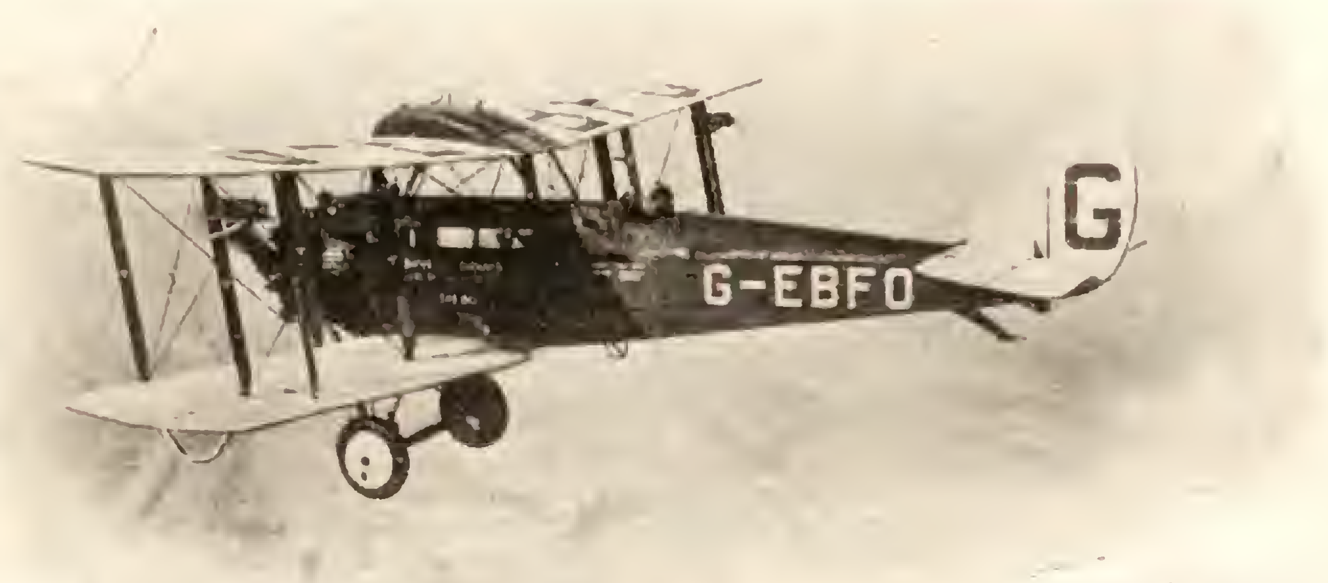
Leader, *Morning Post*, March 15th.



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stagger, are such as to lead to high speed of auto-rotation at a large angle of incidence. Further, it is pointed out that such characteristics render a biplane less statically stable in pitch than one with larger gap and stagger, and therefore it has less tendency to "unstall" than is usual; it is shown that these characteristics are likely to lead to danger in recovery from a spin, unless the centre of gravity is well forward and/or there is a very good margin of control.

A considerable amount of further information is required before the conclusions of this report can be fully confirmed by quantitative analysis of the motion in a spin, but there seems little doubt that the features in design which may lead to danger in spinning have now been recognised and the reason for the danger understood to a large extent.

Other Work on the Subject—Papers bearing on the subject of spinning to which reference is made in the above report are:—

R. & M. 828.—A continuous rotation balance for the measurement of L_p at small rates of roll.—Relf and Lavender.

R. & M. 936.—A continuous rotation balance for the measurement of pitching and yawing moments due to angular velocity of roll (M_p and N_p).—T. Lavender.

R. & M. 831.—On the effect of sideslip on the aerodynamic forces and moments (including those due to the controls) for a model S.E.5a aeroplane.—H. B. Irving and A. S. Batson.

R. & M. 787.—Lateral control of Bristol Fighter at low speeds. Measurement of rolling and yawing moments of model wings due to rolling.—F. B. Bradfield.

R. & M. 944.—Measurement of pitching moments due to roll of wings of Avro 504k.—F. B. Bradfield.

R. & M. 975.—Auto-rotation measurements on a model aeroplane with zero stagger.—Bradfield and Coombes.

R. & M. 848.—Rolling and yawing moments due to roll of model Avro wings, with standard and interplane ailerons and rudder moments for standard and special large rudder.—R. A. E.

R. & M. 733.—Preliminary note on the effect of stagger and decalage on the auto-rotation of a R.A.F.15 biplane.—Irving and Batson.

THE REPRESENTATION OF AIRCRAFT PERFORMANCE TESTS, USING NON-DIMENSIONAL VARIABLES, WITH SPECIAL REFERENCE TO THE PREDICTION OF THE EFFECTS OF CHANGE OF LOADING ON PERFORMANCE.

By R. S. Capon, B.A. Presented by the Director of Scientific Research.

R. and M., No. 984 (Ae. 196). November, 1925. Price 4*d.* net.

In Bairstow's "Applied Aerodynamics," Chapter IX, a method of plotting a performance test, using non-dimensional co-ordinates, is described, which has a particular application to the estimation of the effect of change of loading on performance. The application to maximum rates of climb is stated not to be rigorous, however, and this also applies to the formulæ of prediction of change in performance with change of load given in R. and M. 608.

In the present paper the condition is investigated under which the application is rigorous to maximum rates of climb, air speeds for maximum rates of climb, and corresponding airscrew rotation rates; a convenient formula for deducing the maximum rates of climb, maximum angles of climb, etc., for one loading from known values for another loading deduced; and the applicability of the formula checked in so far as rates of climb are concerned by reference to results of tests at Martlesham. A slide rule is described which facilitates the computations.

It is shown that dimensional theory may be applied rigorously when the engine power is proportional to any power, integral or fractional, of the airscrew rate of rotation, and that in this case maximum rates of climb and the corresponding air speeds and airscrew rates of rotation, as well as maximum level speeds with the corresponding airscrew rates of rotation, may be obtained at one loading from tests at another loading by a simple calculation. It is further shown that to a close approximation the calculation reduces to re-plotting the observed values of the above quantities at standard height H at a height H^1 such that the ratio of the power factors at the heights H and H^1 is equal to the ratio of the flying weights.

It is proposed to check more accurately the validity of the method by further tests at two flying weights, first determining the power factors by an independent series of tests.

ON THE SYSTEM OF VORTICES GENERATED BY A CIRCULAR CYLINDER IN STEADY MOTION THROUGH A FLUID.

By C. N. H. Lock, M.A.

R. and M. No. 986 (Ae. 198). (6 pages and 3 diagrams.) November, 1925. Price 4*d.* net.

This paper deals with the Kármán theory of the wake left behind the cylinder which takes the form of a double row of two-dimensional vortices, and suggests that the recent results obtained at higher values of the Reynolds number (see R. and M. 825)* may have a bearing on the application of the theory when there is a certain change with increase in speed in the resistance and frequency coefficients observed in the neighbourhood of ($VL/\nu = 10^5$). The note concludes not that the Kármán regime ceases to apply at the higher Reynolds number, but that the sudden drop in resistance at $VL/\nu = 4 \times 10^5$ corresponds to the sudden increase of frequency and decrease of the distance between the rows.

* R. & M. 825. "On the sound emitted by wires of circular section when exposed to an air current." By E. F. Relf. Phil. Mag. ser. 6 XLII, p. 173. 1921.

NOTE ON THE MINIMUM SPEED FROM WHICH THE DIRECTION OF A GLIDING AEROPLANE CAN BE CHANGED TO A HORIZONTAL PATH FOR LANDING.

By F. W. Meredith, B.A. Presented by the Director of Scientific Research.

R. & M. No. 993 (Ae. 204). June, 1925. Price 4*d.* net.

Recent improvements in the control of aeroplanes at low speeds raise the question of the minimum speed at which it is safe to come in to land with an under-carriage which has usually not been designed to absorb the whole of the vertical velocity present during a glide. In the analysis of the present paper it has been assumed that the aeroplane is flying horizontally at the moment of contact of the wheels with the ground, so that the motion of approach to the ground is that at which the wings are giving the maximum possible lift.

It is concluded that for a normal aeroplane the speed must be about 20 per cent. above the stalling speed, to provide the necessary excess lift for flattening out under the above hypothesis.

THE AIR-BUBBLE VISCOMETER.

By Guy Barr, B.A., D.Sc.

Work performed for the Department of Scientific and Industrial Research.

R. and M. No. 988 (M. 31). April, 1925. Price 9*d.* net.

It was desired to find whether, and under what circumstances, the rise of a large bubble in a vertical tube containing liquid could be used as an indication of the viscosity of the liquid.

The method has been used by Faust ("Zeits. Phys. Chem.," 1919, 39, 758) for very viscous oils; by Abrams, Kavanagh and Osmond ("Chem. and Met. Eng.," 1921, 25, 665) for oils of 0·15 to 0·9 poise, and by Gardner and Holdt (Circ. No. 128 of Paint Manufacturers' Association of the U.S., 1921) in varnish works for oils of viscosity between 0·5 to 5·5 poises.

The effects of length of bubble and diameter of tube have been examined, and the rate of rise determined for several oils of known viscosity and surface tension, for water and for glycerin in different tubes. A dimensional analysis of the problem has been made involving certain assumptions which seem to be capable of verification, in any particular case, from the appearance of the bubble.

Above a certain limit the length of the bubble is without appreciable effect on the rate of rise. For bubbles rising "slowly" in a given tube, *i.e.*, at such a rate that not more than one thickened annulus of liquid appears between the bubble and the walls towards the rear end of the bubble, it has been found that the rate of rise is inversely proportional to the kinematic viscosity provided that the surface tension is constant. An approximate determination has been made of the form of the function of r/a upon which, in addition to the viscosity, the rate of rise depends. In certain conditions, *e.g.*, when light oils are examined in a tube of such a diameter as to give a convenient rate of rise, the rate may vary about 14 times as fast as the diameter and six times as fast as the surface tension, but these effects become very much less pronounced when viscous liquids are used in wide tubes.

The air bubble viscometer may be used with confidence for the approximate comparison of viscosities of materials of the same class. A simple modification is suggested which enables a check to be made on the assumed constancy of surface tension.

AMERICAN NATIONAL ADVISORY COMMITTEE REPORTS.

The National Advisory Committee for Aeronautics in the United States of America corresponds to our own Aeronautical Research Committee, and perhaps it may be said that the publications issued by the American body score over those published in this country by being issued much more rapidly than is usually the case with the British Reports and Memoranda. Two distinct classes of reports are issued, the first being known as Technical Reports. These are printed and illustrated by photographs and/or drawings and diagrams. The second class are known as Technical Notes, and are issued in mimeographed form so as to enable them to be rapidly distributed to a somewhat smaller, but directly interested circle of readers. Copies of the Reports and Notes can be obtained from the Superintendent of Documents, Government Printing Office, Washington, D.C., U.S.A., but the American N.A.C.A. have a Technical Assistant in Europe, whose office is at 18, Rue Tilsitt, Paris, France, from whom, we understand, copies can be obtained. Readers who are in a hurry to obtain copies of the reports are advised to write to him, as usually some considerable time will be saved by so doing.

In so far as space permits, we hope to publish regularly in The Aircraft Engineer summaries of these American Reports and Notes as they are issued. In the meantime, the following summaries of the Reports published in 1925, and list of Technical Notes issued last year, may be of interest.

Summaries of Technical Reports Published in 1925.

Report No. 210, entitled "Inertia Factors of Ellipsoids for Use in Airship Design," by L. B. Tuckerman, Bureau of Standards.—This report is based on a study made by the writer as a member of the special committee on design of Army semi-rigid airship "R.S.1" appointed by the National Advisory Committee for Aeronautics.

The increasing interest in airships has made the problem of the potential flow of a fluid about an ellipsoid of considerable practical importance. In 1833, George Green, in discussing the effect of the surrounding medium upon the period of a pendulum, derived three elliptic integrals, in terms of which practically all the characteristics of this type of motion can be expressed. The theory of this type of motion is very fully given by Horace Lamb in his "Hydrodynamics," and applications to the theory of airships by many other writers. Tables of the inertia coefficients derived from these integrals are available for the most important special cases. These tables are adequate for most purposes, but occasionally it is desirable to know the values of these integrals in other cases where tabulated values are not available. For this reason it seemed worth while to assemble a collection of formulæ which would enable them to be computed directly from standard tables of elliptic integrals, circular and hyperbolic functions and logarithms without the need of intermediate transformations. Some of the formulæ for special cases (elliptic cylinder, prolate spheroid, oblate spheroid, etc.) have been published before, but the general forms and some special cases have not been found in previous publications.

Report No. 211, entitled "Water Model Tests for Semi-rigid Airships," by L. B. Tuckerman, Bureau of Standards.—The design of complicated structures often presents mathematical problems of extreme difficulty which are frequently insoluble. In many cases, however, the solution can be obtained by tests on suitable models. These model tests are becoming so important a part of the design of new engineering structures that their theory has become a necessary part of an engineer's knowledge.

For balloons and airships water models are used. These are models about 1/30 the size of the airship hung upside down and filled with water under pressure. The theory shows that the stresses in such a model are the same as in the actual airship.

In the design of the Army semi-rigid airship R.S.1 no satisfactory way was found to calculate the stresses in the keel due to the changing shape of the bag. For this purpose a water model with a flexible keel was built and tested. This paper gives the theory of the design, construction, and testing of such a water model.

Report No. 212, entitled "Stability Equations for Airship Hulls," by A. F. Zahm.—In the text are derived simple formulæ for determining, directly from the data of wind-tunnel tests of a model of an airship hull, what shall be the approximate character of oscillation, in pitch or yaw, of the full-scale airship when slightly disturbed from steady forward motion.

Report No. 213, entitled "A Résumé of the Advances in Theoretical Aeronautics made by Max M. Munk," by Joseph S. Ames.—In order to apply profitably the mathematical methods of hydrodynamics to aeronautical problems, it is necessary to make certain simplifications in the physical conditions of the latter. To begin with, it is allowable in many problems, as Prandtl has so successfully shown, to treat the air as having constant density and as free of viscosity. But this is not sufficient. It is also necessary to specify certain shapes for the solid bodies whose motion through the air is discussed, shapes suggested by the actual solids—airships or airfoils—it is true, but so chosen that they lead to solvable problems.

In a valuable paper presented by Dr. Max M. Munk, of the National Advisory Committee for Aeronautics, Washington, to the Delft Conference in April, 1924, these necessary simplifying assumptions are discussed in detail. It is the purpose of the present paper to present in as simple a manner as possible some of the interesting results obtained by Doctor Munk's methods.

(*To be continued.*)

CORRESPONDENCE

In order to leave as much space as possible for new articles in The Aircraft Engineer each month, letters dealing with the various points raised will be published in the Correspondence columns of *Flight* week by week. Letters referring to the article by Mr. Frank Courtney on "Stalled Flight and Control," which appeared in the February 25 issue, will be found in *Flight* of March 4 (Mr. R. Reynolds and Capt. B. Thomson), March 11 (Capt. G. de Havilland and Mr. Courtney), and March 18 (Mr. R. Reynolds).

ERRATA

Although a correction was published in *Flight* of March 11 of two errors which crept into Mr. North's article on "Aircraft Performance," published in The Aircraft Engineer of February 25, it is thought that some of our readers may have missed these corrections, and consequently they are repeated here. On p. 13 the last words of the first paragraph should have read "gun fire" and *not* "gun power" as printed. On p. 15 the last word of the first line of column 2 should have been "mechanistic" and *not* "metaphysic."

Mr. R. Reynolds writes to point out that a small error crept into his letter published in the Correspondence column of *Flight* of March 18. In the seventh line from the bottom the words "stalled control" should read "slotted control."

ALAN COBHAM ENTERTAINED—AND HONOURED

Mr. Alan J. Cobham, and his companions in the recent London—Cape Town—London flight, Mr. A. B. Elliott and Mr. B. W. G. Emmott, attended two important functions, held in their honour last week. The first was a banquet given at the Savoy Hotel by the Royal Aero Club and the Society of British Aircraft Constructors on March 17, at which the Duke of Sutherland presided and a number of well-known personalities of the aviation world were present. In giving the toast of the flight the chairman paid tribute to Mr. Cobham and his companions for the accomplishment of this world-renowned flight, which he said was a triumph for British aviation. Sir Philip Sassoon (Under-Secretary for Air) also associated himself with the toast, which was supported by Mr. T. O. M. Sopwith on behalf of the S.B.A.C.

The second function was a luncheon given by the Aldwych Club at the Connaught Rooms on March 18. Sir Charles Wakefield presided and presented Mr. Cobham with a silver mug, saying that the flight to the Cape and back was one of historic importance, and that Mr. Cobham had beaten out an Imperial track and helped to lay the foundations of what would one day be a network of airways throughout the Empire .

Mr. Cobham, in responding on both these occasions, alluded to the fact that the flight was not made in order to find an air route from London to the Cape, but to ascertain the possibilities of intermediate air routes. He also briefly outlined some of their experiences and referred to his conclusions regarding the practicability of air services in Central Africa, which were most favourable.

The Air Ministry announces that H.M. the King has been pleased to approve the award of an Air Force Cross to Mr. A. J. Cobham, in recognition of the valuable and distinguished service he has rendered to aviation by his recent London—Cape Town—London flight and previous flights such as : (1) London—Rangoon —London ; (2) London—Egypt—Palestine—Syria—London ; (3) London—Tangier—London and (4) London—North Africa—Italy—London.

The gold medal of the Royal Aero Club has been awarded to Mr. A. J. Cobham in recognition of his services to aviation, and the bronze medal of the club has been awarded to Mr. A. B. Elliott, who accompanied Mr. Cobham as engineer on the London to Cape Town flight.

Tomorrow, March 26, Mr. Cobham will personally describe his flight to Cape Town and back at the Aeolian Hall, New Bond Street, W. Sir Charles Wakefield will preside, and the lecture, which will be illustrated by lantern slides from photographs taken during the flight, will commence at 8.30 p.m

LIGHT 'PLANE CLUB DOINGS

London Aeroplane Club

The total flying for the week was 23 hrs. 15 mins. The following members had flying instruction :—L. J. C. Mitchell, O. J. Barros, Sir John Rhodes, Mrs. Atkey, G. Wallcousins, E. D. Moss, W. Hay, A. Lees, R. P. Cooper, Miss O'Brien, S. W. Bradshaw, A. Southgate, H. Kennedy, R. C. Presland, L. G. Anderson, R. Malcolm.

The following members made solo flights :—Major K. M. Beaumont, Mrs. Eliott-Lynn, P. G. Lucas, N. Jones. D. Kittell on his own D.H. " Moth " was flying both Saturday and Sunday.

Mrs. Eliott-Lynn and N. Jones flew to Yeovil on Saturday on a D.H. " Moth " recently taken over by two members from the De Havilland Co.

The following subscriptions have been received towards the purchase of a third D.H. " Moth " :—D. Watt, £5 ; D. Foulerton, £3 ; Miss Horsman, £2 ; H. Solomon, £2 ; subscriptions already published, £678. Total to date, £690.

Capt. F. G. M. Sparks, the senior instructor, is laid up with acute bronchitis and pleurisy and will be away from duty for at least a fortnight.

The flying time of the London Aeroplane Club has now exceeded 500 hours.

The Lancashire Aero Club

GEBLV and GEBMQ were in use up to Saturday, on which day a broken piston ring put MQ out of action, this machine being replaced by GEBLR. Flying has been possible on all days except Monday and Friday.

Mr. Stack gave instruction to :—C. Agar, 3 hrs. 20 mins. ; R. Wade, 3 hrs. 15 mins. ; B. Smith, 2 hrs. 20 mins. ; S. Gattrell, 1 hr. 35 mins. ; A. Goodyear, 1 hr. 30 mins. ; A. Barnes, 1 hr. 20 mins. ; R. Turner, 1 hr. 5 mins. ; L. Slater, 50 mins. ; A. Macnair, 30 mins. ; C. Brown, 30 mins. ; R. Colley, 30 mins. ; D. Turmers, 25 mins. ; J. Leeming, 25 mins. ; A. Leigh, 15 mins. ; M. Lacayo, 10 mins.

Mr. Cantrill instructed :—C. Brown, 1 hr. 10 mins. ; A. Goodyear, 35 mins. J. Leeming, 30 mins.

Mr. Scholes instructed :—R. Williams, 55 mins. ; J. Leeming, 45 mins. ; P. Michelson, 35 mins. ; S. Crabtree, 35 mins.

Solo flights by :—A. Goodfellow, 30 mins. ; M. Lacayo, 40 mins.

Joy rides :—Miss D. Shirca, 10 mins.

Tests occupied 1 hr. 35 mins. Total dual, 23 hrs. 5 mins. Total solo, 1 hr. 10 mins. Total time flown, 26 hours.

Members are asked to note that the aerodrome is closed each Monday, which is the staff day of rest. Joy rides can be given to members only.

The Newcastle-upon-Tyne Aero Club, Ltd.

Report for week ending March 21, 1926 :—Slightly improved weather conditions enabled a considerably larger amount of flying to be carried out during the week than has been possible for some time.

The club is still hampered in having only one machine on service, however, and, of course, one instructor. All previous records, using one machine, were passed on Sunday, when 8 hrs. 15 mins. was flown.

The total for the week was 29 hrs. 15 mins., made up as follows :—

With Major Packman : Dual instruction, 15 hrs. 20 mins. ; secondary dual, 4 hrs. 5 mins. ; passenger flights, 3 hrs. 45 mins.

" A " pilots flying with passengers, 5 hrs. 45 mins. Engine test, 20 minutes (overhauled engine).

The following members had instruction :—Mrs. Marcks, Miss Leathart, Messrs. George, Somerville, Twine, Irving, Leete, W. Todd, Bainbridge, Campbell, Miesagaes, Whitfield, C. Thompson, L. Smith, Sandilands, Bruce. Secondary dual : Messrs. Stobie, Heppell, Thompson, Irving, Thompson, Miss Leathart. " A " pilots who flew : Messrs. Stobie, Heppell, R. N. Thompson, N. S. Todd, W. Baxter Ellis.

The Club was visited by the President, Colonel Sir Joseph Reed, on Sunday morning and was taken for a flight of one hour by Mr. Ellis. After about half-an-hour Mr. Ellis landed near Warkworth to inquire as to whether Sir Joseph was enjoying himself. Each had a cigarette and then proceeded on the return journey to the aerodrome, Sir Joseph stating that he had thoroughly enjoyed the trip.

Other passengers during the week flew with Major Packman as under :—Capt. Roberts, Mr. Stewart, Mr. Alderson, Mr. Deuchar, Mrs. Robson Mr. Robson, Miss Crowther, Miss Wilkie, Miss Fail, Mrs. Ratcliffe.

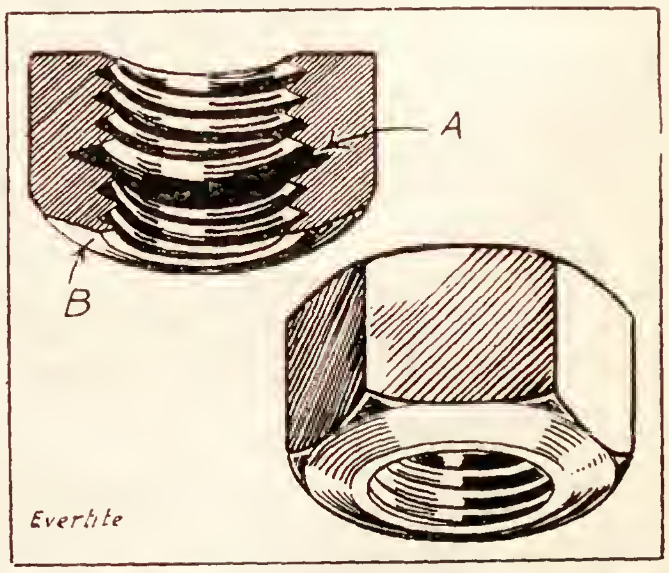
THE "EVERTITE" LOCKNUT

In no other branch of engineering is the problem of locking nuts securely so important as it is in aeronautical engineering, for the danger arising from nuts working loose on aircraft are obvious.

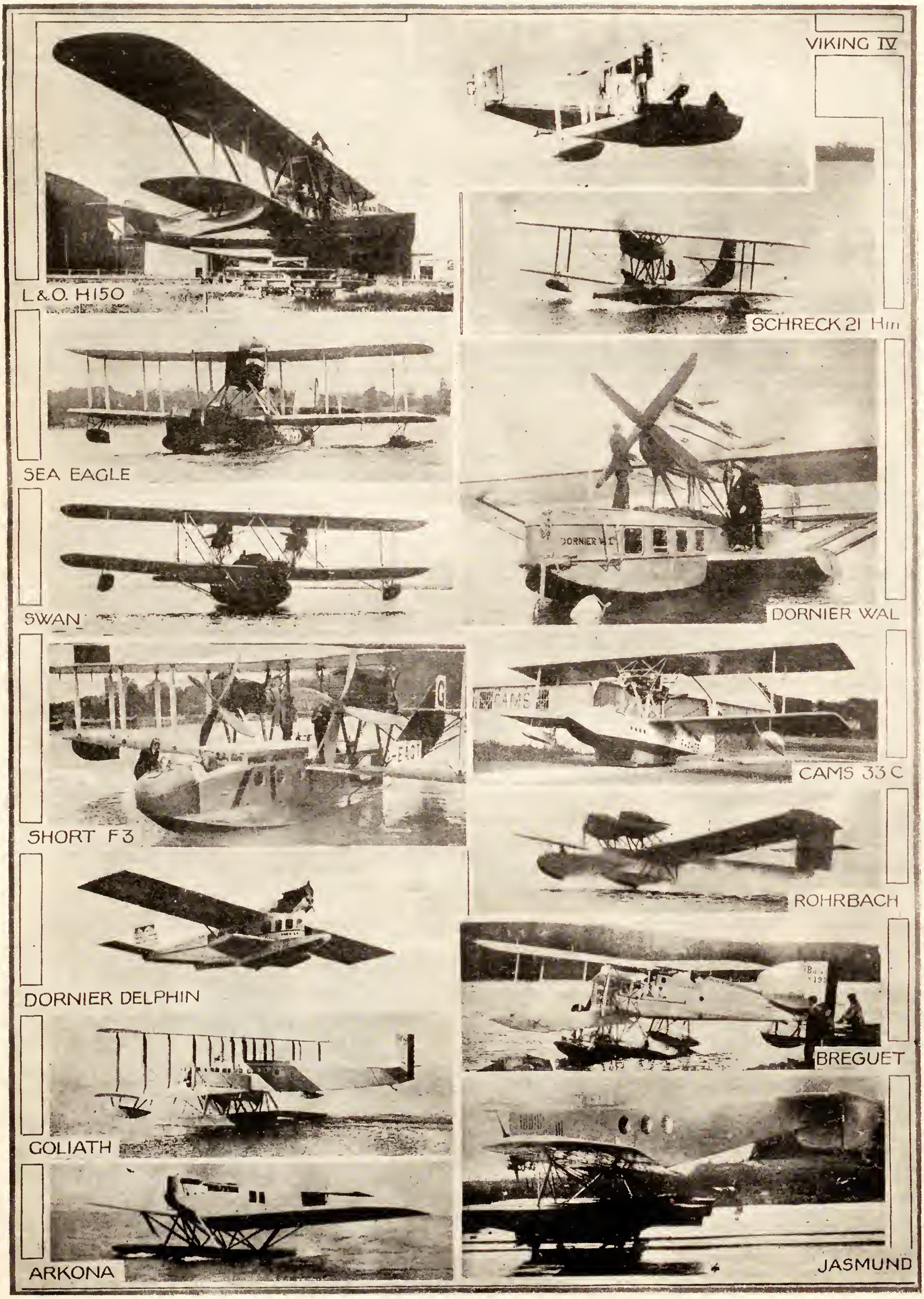
A simple but effective device has recently been put on the market by British Evertite Locknuts, Ltd., of 22, Bridge Street, Manchester, which, it is claimed, will do much to eliminate this risk, and its very low cost and simple operation should ensure its universal adoption.

Externally the " Evertite " locknut closely resembles an ordinary nut, as may be observed from the accompanying sketch, but it has a bevelled end B, and an annular V-cut groove A within the nut. The action of the " Evertite " is as follows : When screwed home with the bevelled end in contact with the resisting surface, the reaction causes the groove to yield. Thus, a slight but sufficient distortion of the thread then results, thereby effecting a positive, or direct, lock upon the bolt, which functions repeatedly without injury to the thread of either nut or bolt.

" Evertite " locknuts are made in all standard sizes. In place of the present indirect method of obtaining security by the use of either double nuts, a nut and spring washer, or a castle nut with split pins, the " Evertite " can safely be employed as a direct and self-contained locknut in every branch of engineering.



THE " EVERTITE " LOCK-NUT : When screwed home with the bevelled end B in contact with the resisting surface, the reaction causes the groove A to yield, causing a slight distortion of the thread and consequent positive lock upon the bolt.



CIVIL MARINE AIRCRAFT: Some of the machines referred to by Mr. Simmonds. (See pp. 181, 182.)

DETAILS OF CIVIL MARINE AIRCRAFT. Supplement to Mr. O. E. Simmonds' Paper. (See pp. 180 and 182)

Table 1. Main Particulars

							Flying Boats							*Float Seaplanes*			
Type	Air Yacht	H150	Viking IV	21.Hm. T.6	Vulture	Sea Eagle	Wal	Swan	33C	H190	F3	R.O. III	Delphin	14 T2	Goliath	Arkona	Jasmund
Constructor	Loening	Lioré et Olivier	Vickers	Schreck	Vickers	Supermarine	Dornier	Supermarine	C.A.M.S.	Lioré et Olivier	Short	Rohrbach	Dornier	Breguet	Farman	L.F.G.	L.F.G.
Monoplane or biplane	Mono.	Bl.	Bl.	Bl.	Bl.	Bl.	Mono.	Bl.	Bl.	Bl.	Bl.	Mono.	Mono.	Bl.	Bl.	Mono.	Mono.
Approximate date of construction	1921	1925	1921	1925	1924	1922	1922	1924	1922	1925	1920	1925	1921	1920	1922	1922	1922
Materials of construction...	Composite	Wood	Wood	Wood	Wood	Wood	Metal	Wood	Wood	Wood	Wood	Metal	Metal	Metal	Wood	Metal	Metal
Engines, No. and type	1 Liberty	3 Jupiter	1 Napier	1 Lorraine	1 Napier	1 Napier	2 Rolls-Royce	2 Napier	2 Hispano	1 Jupiter	2 Rolls-Royce	2 Rolls-Royce	1 B.M.W.	1 Renault	2 Jupiter	1 B.M.W.	1 B.M.W.
Total normal horse-power	400	1200	440	450	440	440	730	880	550	400	700	730	240	300	800	185	185
Wing area ... ... sq. ft.	385	1470	635	575	828	620	1120	1272	995	692	1430	785	550	549	1732	388	430
Normal Accommodation—																	
Crew	1	2	1	2	1.	1	2	2	2	2	2	3	2	1	2	2	2
Passengers	4	12	6	4	6	7	11	10	4	6	8	12	5	3	12	4	4
Power loading, lbs. per H.P.	10·15	12·2	13·62	14·3	14·78	14·78	15·4	15·6	16·46	17·1	18·18	18·7	22·5	14·33	16·0	21·97	23·24
Wing loading, lbs. per sq. ft.	10·55	9·95	9·45	11·2	7·85	10·5	10·0	10·78	9·1	9·9	8·98	17·4	9·8	7·84	7·4	10·48	10·0
Maximum speed (sea level) m.p.h.	135	112	111	118	105	99	115	105	120	102·5	95	124	100	105	105	105	105
Crusing speed (sea level) m.p.h.	115	93	90	100	85	84	97	87	100	87	75	112	78	90	87	87	87
Rate of climb (sea level) ft. per min.	1000	560	765	657	555	540	470	510	475	320	500	600	390	483	510	410	450
Landing speed (sea level) m.p.h.	52	56	52·5	59·5	48	56	53	58	56	56	51	68	52·5	48	47	56	56
Kl. max (deduced)	·765	·624	·67	·615	·67	·659	·70	·63	·57	·615	·678	·74	·70	·67	·655	·655	·627
Speed range ... ... m.p.h.	83	56	58·5	58·5	57	43	62	47	64	46·5	44	56	47·5	57	58	49	49

Table 2. Component Weights. (Lbs.)

Type	Air Yacht	H.150	Viking IV	21 Hm. T6	Vulture	Sea Eagle	Wal	Swan	33C	H190	F3	R.O. III	Delphin	14T2	Goliath	Arkona	Jasmund
Weight fully loaded	4059	14650	6000	6445	6500	6500	11250	13710	9050	6840	12700	13670	5400	4300	12800	4060	4300
Power plant	920	2646	1394	1302	1415	1284	2410	2600	2100	992	2921	2480	965	1148	1786	750	750
Fuel oil and tanks...	550	1941	695	849	703	864	1075	1640	1499	719	1253	996	457	497	1292	571	552
Structure	1400	5450	2208	2275	2571	2546	4748	5439	3310	2560	5404	5300	2401	1652	5780	1675	1720
Accommodation	153	225	72	143	100	150	330	435	110	134	160	600	242	90	331	88	132
Disposable load	1036	4388	1631	1876	1711	1656	2687	3596	2031	2435	2962	4294	1335	913	3611	976	1146
Crew	180	360	180	180	180	180	360	360	180	180	360	360	180	180	360	180	180
Equipment...	195	513	175	213	175	235	305	254	420	437	315	260	290	220	288	218	218
Paying load	661	3515	1276	1483	1356	1241	2022	2982	1431	1818	2287	3674	865	513	2963	578	748
Variation in paying load per 100 miles	172	650	215	283	215	280	340	538	500	234	418	302	145	166	432	185	185

Table 3.—Component Weights. (Lbs. per H.P.)

Type	Air Yacht	H150	Viking IV.	21 Hm. T6	Vulture	Sea Eagle	Wal	Swan	33C.	H190	F3.	R.O. III.	Delphin	14T2.	Goliath	Arkona	Jasmund
Fully Loaded	10·15	12·2	13·63	14·3	14·78	14·78	15·4	15·6	16·46	17·1	18·18	18·7	22·5	14·33	16·0	21·97	23·24
Power Plant	2·30	2·21	3·16	2·90	3·22	2·92	3·30	2·96	3·82	2·48	4·18	3·40	4·01	3·82	2·23	4·05	4·05
Fuel, Oil and Tanks	1 38	1·62	1·58	1·89	1·60	1·96	1·47	1·87	2·72	1·80	1·79	1·37	1·90	1·66	1·62	3·09	2·99
Structure	3·50	4·54	5·02	5·05	5·84	5·80	6·50	6·18	6·02	6·40	7·74	7·25	10·02	5·51	7·24	9·06	9·30
Accommodation	0·38	0·18	0·16	0·22	0·23	0·34	0·45	0·50	0·20	0·33	0·23	0·81	1·01	0·30	0·41	0·48	0·71
Disposable Load	2·59	3·65	3·71	4·17	3·89	3·76	3·68	4·09	3·70	6·09	4·24	5·87	5·56	3·04	4·50	5·29	6·19
Crew	0·45	0·30	0·41	0·40	0·41	0·41	0·49	0·41	0·33	0·45	0·52	0·49	0·75	0·60	0·45	0·97	0·97
Equipment	0·49	0·43	0·40	0·47	0·40	0·53	0·42	0·29	0·76	1·09	0·45	0·36	1·21	0·73	0·35	1·18	1·18
Paying Load	1·65	2·92	2·90	3·30	3·08	2·82	2·77	3·39	2·61	4·55	3·27	5·02	3·60	1·71	3·70	3·14	4·04
Variation in Paying Load per 100 miles ...	0·43	0·54	0·49	0·63	0·49	0·64	0·47	0·61	0·91	0·59	0·60	0·41	0·61	0·55	0·54	1·0	1·0
Accommodation per Passenger lbs.	38·2	18·75	12·0	36·7	16·6	21·4	30·0	43·5	27·5	22·3	20·0	50·0	48·4	30·0	27·6	22·0	33·0

Table 4.—Component Weights. (Per Cent. of Total Weight.)

Type	Air Yacht	H150	Viking IV.	21 Hm. T6.	Vulture	Sea Eagle.	Wal	Swan	33C.	H190	F3.	R.O.III.	Delphin	14T2.	Goliath	Arkona	Jasmund
Power Plant	22·6	18·1	23·2	20·2	21·8	19·7	21·4	19·0	23·2	14·5	23·0	18·1	17·8	26·7	13·9	18·5	17·4
Fuel, Oil and Tanks	13·6	13·3	11·6	13·2	10·8	13·3	9·6	12·0	16·6	10·5	9·9	7·3	8·5	11·6	10·1	14·0	12·8
Structure	34·5	37·2	36·8	35·4	39·6	39·2	42·2	39·6	36·6	37·4	42·5	38·8	44·5	38·4	45·1	41·2	40·0
Accommodation	3·8	1·5	1·2	2·1	1·5	2·3	2·9	3·2	1·2	2·0	1·3	4·4	4·5	2·1	2·6	2·2	3·1
Disposable Load	25·5	29·9	27·2	29·1	26·3	25·5	23·9	26·2	22·4	35·6	23·3	31·4	24·7	21·2	28·3	24·1	26·7
Crew	4·4	2·5	3·0	2·8	2·8	2·8	3·2	2·6	2·0	2·6	2·8	2·6	3·3	4·2	2·8	4·4	4·2
Equipment	4·8	3·4	2·9	3·3	2·7	3·6	2·7	1·9	4·6	6·4	2·5	1·9	5·4	5·1	2·3	5·4	5·1
Paying Load	16·3	24·0	21·3	23·0	20·8	19·1	18·0	21·7	15·8	26·6	18·0	26·9	16·0	11·9	23·2	14·3	17·4
Variation in Paying Load per 100 Miles ...	4·2	4·4	3·6	4·4	3·3	4·3	3·2	3·9	5·5	3·4	3·3	2·2	2·7	3·9	3·4	4·6	4·3

DEVELOPMENT OF CIVIL MARINE AIRCRAFT

Some unusually interesting data collected by Mr. O. E. Simmonds

THE paper read by Mr. O. E. Simmonds before the Institution of Aeronautical Engineers on March 9, under the title "The Development of Civil Marine Aircraft," proved an unusually interesting one. The paper was rather long, and does not lend itself to being summarised, but a lot of very valuable information was contained in a series of tables, which we reproduce on p. 181. For the first time comparative figures for a number of seaplanes have been made available, and in order to appreciate what the tables actually mean, we quote below the lecturer's explanatory remarks:—

(1) The machines are arranged in order of power loading.

(2) As the aim of the tables is to compare designs, hull soakage is not included in the structure weight of wooden machines.

(3) Machines built as amphibians have had all amphibian gear removed in computing structure weight in order to obtain more accurate comparisons.

(4) All figures are calculated on the basis of a 300-mile flight at cruising speed, and the effect on paying load of each additional 100 miles is indicated.

(5) Disposable load includes crew, equipment and paying load—not fuel.

(6) Table I indicates the maximum number of crew and passengers for which provision is made. In other tables, aircraft of less than 10,000 lb. gross weight are assumed to require one pilot only; above that weight allowance is made for a second member of the crew.

(7) It will be noted that considerable disparity exists between the weight of accommodation and equipment for the various machines. As in some instances items naturally falling under these headings may be fixtures and thus become included in structure weight, no attempt has been made to reduce the weights under these two headings to a standard figure. All machines carry wireless equipment, flying instruments and marine gear, although the weights of these items vary considerably.

(8) In Tables III and IV the complete list of component weights is given in terms of normal horse-power and as percentages of total weight respectively. By this means comparisons of enhanced value are obtainable, since inefficient components of each machine can readily be seen and their bearing on the final index figures gauged.

By way of assisting in forming an idea of the various types of machines in question, we give, on p. 180, photographs of 14 out of the 16 machines dealt with by the lecturer. Although the photographs are small, they should illustrate such points as must be kept in mind in making comparisons, the more so as all the machines will be fairly familiar to readers of FLIGHT, practically all the machines having previously been described and illustrated in FLIGHT at some time or other.

As regards the paper itself, it may be said to have tended to demonstrate that the seaplane, regarded as a commercial vehicle, is not anything like as inferior to the landplane in the matter of load carried per horse-power as many have imagined.

◆ ◆ ◆ ◆

The Polar Flight Expeditions

JUST as everything was ready for a start with the polar flight expedition, led by Capt. G. H. Wilkins, both the aeroplanes to be employed for the purpose of exploring the unknown arctic regions were damaged during trial flights at Fairbanks, Alaska. As a result, it will be some days before the machines can be repaired and a start for the Pole made.

Meanwhile successful trials are being continued with the Amundsen-Ellsworth polar airship "Norge" at Rome, while it is reported from New York that Commander Richard E. Byrd has obtained leave from the U.S. Navy to attempt a flight to the North Pole. He proposes to use a Fokker machine and to start from Spitzbergen.

Pussyfoot Claws at Croydon

ONE of the items—and a much-needed one—of the improved London Terminal Aerodrome at Croydon that had been planned by the Air Ministry was the erection of a big modern hotel, worthy of what was hoped would be Europe's most important of airports. The Croydon Borough Justices, however, have decided otherwise—although not unanimously—for when an application for a licence for the hotel was made by the contractors, backed by the Air Ministry, it was refused. It is difficult to understand the reason for such an outrage against public convenience, an action which makes London official methods the laughing stock of Europe.

South of England Aeroplane Club

WE have received the following announcement respecting the above Club:—The South of England Aeroplane Club, which has been formed under the patronage of Sir Frederic Wise, M.P., and others, expects to commence operations at Brooklands aerodrome in the course of next month, using Avro 504K and D.H. "Moth" machines. A large number of applications for membership have been received, but there are still immediate vacancies. Those who wish to learn to fly during the coming summer should lose no time in getting in touch with this Club. Particulars of the club and its activities can be obtained by sending a stamped envelope to the Secretary, Flying Officer W. Knox, at 21, Airlie Gardens, Ilford, Essex. We understand that it is intended that this club should embrace the whole of the south of England, and not Essex only, as originally intended. Application has been made to the Air Ministry for inclusion in the Light Plane Club scheme.

The Danish Flight to Tokyo

THE two Danish pilots, Lieuts. Botved and Herschend, who left Copenhagen on March 16 in an attempt to fly to Tokyo in two "Junkers" aeroplanes, proceeding from Berlin which was reached the same afternoon, they reached Constantinople a few days later. Lieut. Herschend got to Aleppo on March 21, but lost sight of his companion *en route*. Lieut. Botved, however, had to descend at Eski Shehr (Asia Minor) in foggy weather, but rejoined his companion later at Aleppo.

Coupet's New Record

LIEUT. LUCIEN COUPET, flying a Breguet XIX fitted with a 500 h.p. Farman engine at Villacoublay on March 17, established a new world's altitude record for a machine carrying a load of 1,000 kgs., when he attained an altitude of 6,450 m. (21,158 ft.).

Commercial Air Lines in South America

THE first Bolivian air traffic line is a weekly service running between Cochabamba and Santa Cruz; it is operated with all-metal Junkers-type F.13 aeroplanes, and in the first three months 385 passengers have been carried. This interesting airway development is all the more striking in that it is actually the highest altitude airway in the world, Santa Cruz being 987 ft. above sea level, whilst Cochabamba is at an altitude of no less than 12,000 ft. above sea level and is the world's highest air port.

Reports received from Buenos Aires state that the Junkers Mission in South America intends operating a passenger air line between Buenos Ayres and Montevideo, which is to be flown three times a week. The manager of the Junkers Mission travelled by a Junkers seaplane to Montevideo for the purpose of entering into negotiations with the Postmaster-General of Uruguay. It is hoped that as a result of these discussions the new route will be opened shortly.

Over Siberian Plains by Air

UNDER the pilotage of M. Balyscheff a Russian-built Junkers aeroplane belonging to the "Dobroljot" recently flew from Moscow to Krasnojarsk. The machine was *en route* for Turuchansk and carried mails and passengers destined for several villages in the North Siberian Plains. It is a survey flight, undertaken for the purpose of studying the possibilities for opening an air express service for the benefit of fur traders.

The Rolls-Royce Condor Series III

A DESCRIPTIVE handbook on the Series III Rolls Royce "Condor" aero engine has just been issued by the Air Ministry (Air Publication 1158). Copies can be obtained from H.M. Stationery Office, Kingsway, W.C.2, the price being 4*s*. net. The book, which is remarkably well illustrated by photographs and sketches, is divided into 3 parts; Part I being a description of the engine, Part II instructions for dismantling and assembling, and Part III directions for running and maintenance of the engine.

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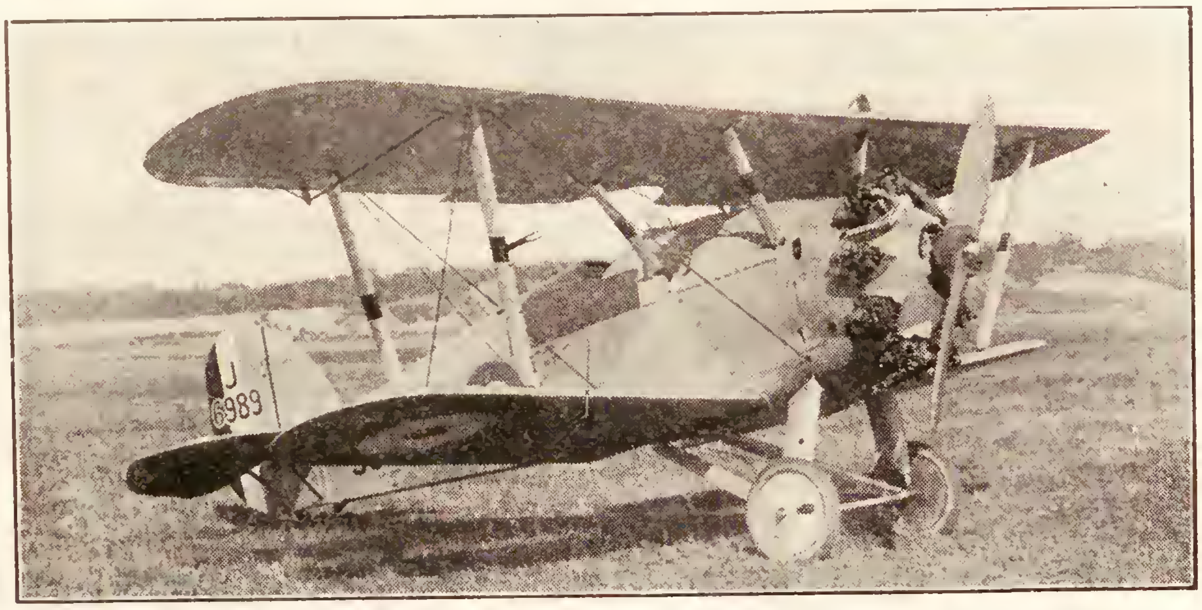

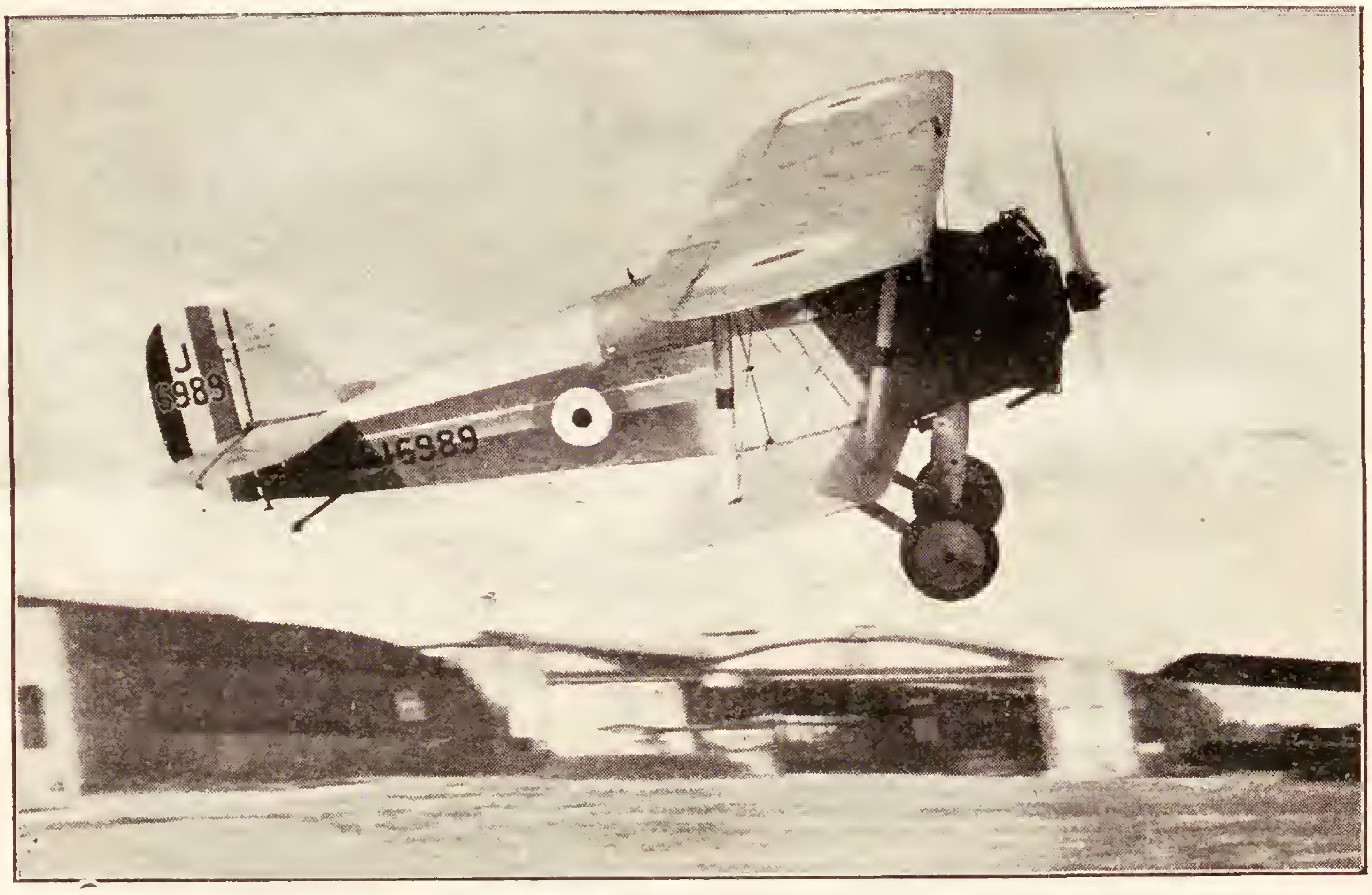

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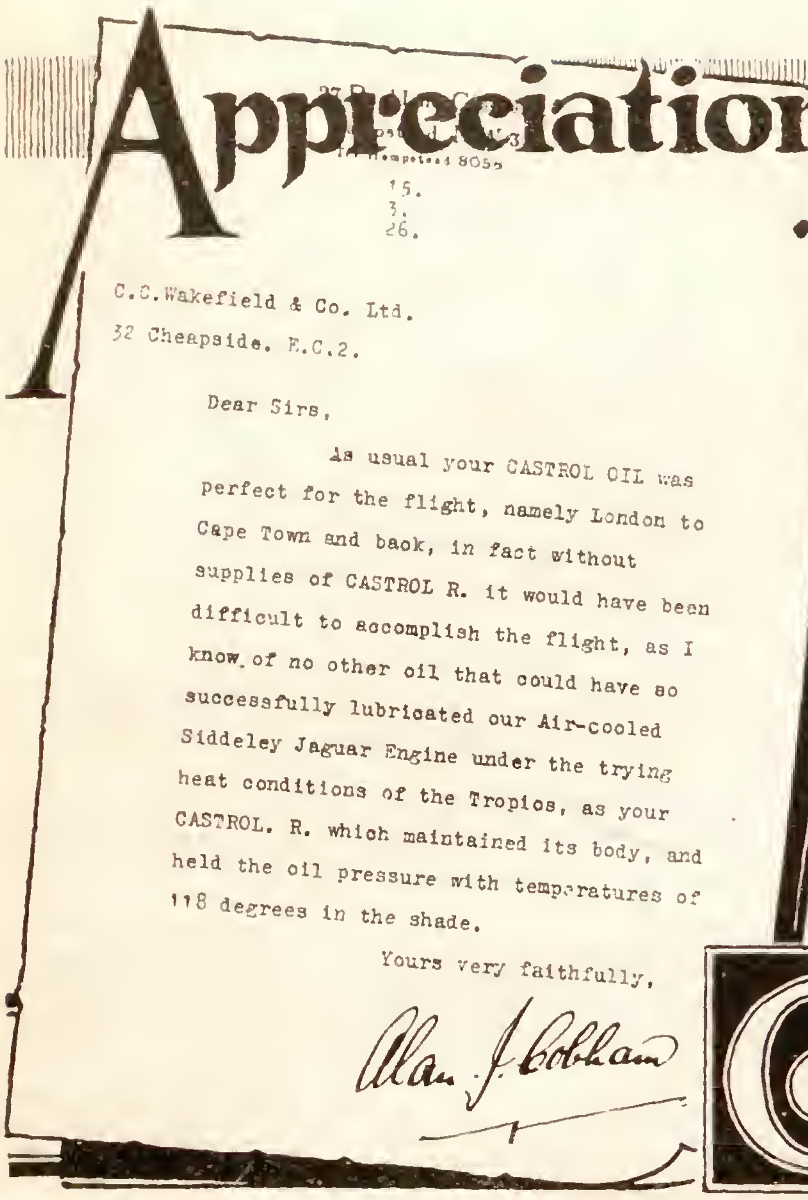

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THE ROYAL AIR FORCE

London Gazette, March 16, 1926.

General Duties Branch.

The following Pilot officers are promoted to rank of Flying Officers :— J. F. Young (Dec. 15, 1925) ; D. A. Boyle (Jan. 31) ; L. S. Birt (Feb. 15). Flight Lieut. S. E. Adams is placed on retired list on account of ill-health and is granted permission to retain rank of Squadron Leader (March 17) ; Observer Officer W. J. Harris is placed on retired list (March 14) ; Flight Lieut. J. H. Bentham is transferred to Reserve, Class A (March 14) ; Flying Officer R. F. de R. Read relinquishes his short service commn. on account of ill-health (March 17).

Stores Branch.

The following Pilot Officers on probation are confirmed in rank (Feb. 10) :— P. P. S. Rickard, L. Taylor, J. E. Welman.

Medical Branch.

G. S. Strachan, M.B., is granted a short service commn. as Flying Officer for three years on active list, with effect from and with seniority of March 1 ; Group Capt. N. J. Roche O.B.E., is placed on retired list at his own request (from half-pay) (March 1).

Reserve of Air Force Officers.

C. V. Hicks is granted a commission in Class A, General Duties Branch as a Pilot Officer on probation (March 16). The following are confirmed in rank :—Flying Officer F. W. Marshall (March 8) ; Pilot Officer A. B. Roche (Feb. 4). Flying Officer E. Bradley is transferred from Class A to Class C (March 3) ; the commission of Pilot Officer on probation W. J. Overy is terminated on cessation of duty (Feb. 26).

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified :—

General Duties Branch

Wing Commander V. Gaskell-Blackburn, D.S.C., A.F.C., to No. 9 Sqdn., Manston, to command ; 28.2.26.

Squadron-Leader H. H. MacL. Fraser, to Aircraft Park, India ; 5.2.26.

Flight-Lieutenant R. Grice, D.F.C., to No. 1 Flying Training Sch., Netheravon ; 22.3.26.

Flying Officers : A. T. K. Shipwright, D.F.C., to Armament and Gunnery Sch., Eastchurch ; 16.3.26. C. H. A. Stevens, to No. 6 Sqdn., Iraq ; 27.2.26.

Pilot Officers : W. I. N. Strong, to No. 5 Flying Training Sch., Sealand, on appointment to a Permanent Commn. (on probation) ; 13.3.26. The undermentioned Pilot Officers are all posted to No. 5 Flying Training Sch., Sealand, on appointment to Short Service Commns. (on probation), with effect from 13.3.26 :—G. E. W. Bankes-Williams, R. A. Barnett, B. J. Bushe-Caryesford, G. Carleton, J. Constable-Roberts, J. W. Duggan, I. J. Fitch, R. S. Fleming, E. C. Foreman, J. H. Harris, H. P. Hudson, R. J. Legg, A. A. Leslie, N. McLeod, R. R. Nash, R. G. Pace, E. J. Pentland, N. C. Pleasance, N. C. R. Roberts, G. H. Shaw, S. R. Sherman, M. A. Smyth, L. R. Stokes, G. A. V. Tyson, E. F. Wain.

Stores Branch

Wing Commander F. H. Kirby, V.C., O.B.E., D.C.M., to No. 4 Stores Depot, Ruislip, to command ; 16.3.26.

Flying Officer V. B. Ranford, to R.A.F. Training Base, Leuchars ; 22.3.26.

Accountant Branch

Flying Officer J. J. T. Rose, to H.Q., Egypt ; 1.3.26.

Medical Branch

Wing Commander J. MacGregor, M.C., M.D., to H.Q., Iraq, for duty as Principal Med. Officer ; 5.3.26.

Flight-Lieutenants : P. C. Livingstone, B.A., F.R.C.S. (E), D.P.H., D.O.M. and S. to Res. Lab. and Med. Officers' Sch. of Instruction, Hampstead ; 18.3.26. C. P. Barber, to Station Commandant, Basrah ; 31.1.26.

Flight-Lieutenant (Quartermaster Medical) J. M. Maxwell, to Basrah Combined Hospital ; 5.3.26.

Flying Officers : C. J. MacQuillan, M.B., B.A., to Station Commandant, Basrah ; 6.2.26. L. C. Palmer-Jones, M.B., to H.Q., Iraq ; 5.3.26. G. M. Anderson, M.B., to No. 5 Flying Training Sch., Sealand ; 14.3.26.

Gordon Shephard Memorial Prize Essay Awards

The Gordon Shephard Memorial prizes, which are given annually for the best essays submitted by members of the Royal Air Force on subjects selected by the Air Council, have been awarded as follows in the 1925 competition :—

First prize : Flight-Lieut. V. H. Tait, Directorate of Organisation and Staff Duties (Signals branch), Air Ministry.

Second prize : Sqdn.-Ldr. F. J. Linnell, O.B.E., Headquarters, Air Defences of Great Britain.

Third prize : Sqdn.-Ldr. L. L. Maclean, P.S.A., Directorate of Organisation and Staff Duties, Air Ministry.

The competition was established as a memorial to the late Brig.-Gen. G. S. Shephard, D.S.O., M.C., R.A.F.

* * * *

IN PARLIAMENT

Royal Air Force Pilots and Discharges

LIEUT.-COMMANDER KENWORTHY, on March 15, asked the Secretary of State for Air how many officer pilots and airmen pilots, respectively, are being discharged from the Air Service between now and the end of the present year ; how many of these are leaving at the expiration of their engagements, and how many are leaving for other causes ?

Major Sir Philip Sassoon : As all our estimates of personal requirements are based on the financial year, I should prefer, if the hon. and gallant Member agrees, to give figures for the financial rather than the calendar year. The number of officer pilots due to pass from the active list of the Royal Air Force in the financial year 1926 is 257, nearly all being short-service officers who will pass into the Reserve ; and the number of airmen pilots due for transfer to the Reserve is five. It is not possible to forecast the number who may cease to be employed for other reasons, but it will be small.

Lieut.-Commander Kenworthy : Does that mean that there are no reductions being made, and that there is only the ordinary normal passing to Reserve ?

Sir P. Sassoon : The hon. and gallant gentleman asked me how many officers are being discharged.

Lieut.-Commander Kenworthy : May I put it in another way ? Are any pilots being " axed " out of the service ? I do not mean those whose engagements have expired. Are any reductions being made apart from that ?

Sir P. Sassoon : No, Sir.

Aircraft Reserves

CAPTAIN CROOKSHANK, on March 17, asked the Secretary of State for Air how many aeroplanes there are in commission and in reserve in the Royal Air Force ?

Sir P. Sassoon : The present first line strength of aircraft in regular squadrons of the Royal Air Force is 658 machines. In addition, the existing auxiliary and special reserve squadrons have an establishment of 58 first line machines. It would not be in the public interest to state the number of aircraft in reserve.

Captain Crookshank : Are we right in assuming that the information that we have not more than 2,424 is still correct ?

Sir P. Sassoon : I believe that some figure did appear, but I am afraid that I cannot give any more information than I have.

The Armistice and American-built Aeroplanes

CAPTAIN GUNSTON asked the Secretary of State for Air the number of American-built aeroplanes flying over the Allied lines on the date of the Armistice ?

Sir P. Sassoon : I have no official information upon this subject, but I am informed that in a book by an American author who had access to official records it is stated that 10 of the American squadrons (of 18 machines each), at the front were equipped with American-built machines on November 11, 1918.

Private Civil Flying

COLONEL DAY asked the Secretary of State for Air whether any action is contemplated with a view to greater freedom being afforded to those who desire to use their own aeroplanes for purposes of experimental tests, business, or pleasure ; and whether the Royal Aeronautical Society and the Air League will be asked for their opinions as to a greater measure of freedom from official interference ?

Sir P. Sassoon : The question of the possible relaxation of some of the existing regulations governing private civil flying has been the subject of discussion with representatives of the Royal Aeronautical Society, the Air League and other aeronautical bodies, and the views expressed are now being most carefully considered by the Air Ministry.

Disarmament : Germany

SIR F. HALL asked the Prime Minister what powers of control are still retained by the Allies with regard to disarmament and naval, military and aircraft development on the part of Germany ; and what machinery exists for exercising those powers ?

The Prime Minister : The Aeronautical Commission of Control, having completed its work, was, in agreement with the German Government, replaced in 1922 by a Committee of Guarantee, whose task is to ensure that aeronautical development in Germany does not infringe the provisions of the Treaty of Versailles. Negotiations are now in progress with a view to withdrawing the Committee as soon as Germany's obligations in regard to future aeronautical development have been defined in agreement between the ex-Allied Governments and Germany.

Sir F. Hall : May I ask whether the Government consider it necessary or advisable to exercise control over the future development of the aircraft policy of Germany ?

The Prime Minister : I think that is provided for in Article 203.

Empire Air Communications

SIR H. BRITTAIN asked whether, following the successful flights which have been and are being made from North to South Africa, and vice versa, it is the intention of his Department to develop further aviation in that continent ; and, if so, whether he can give the House any outline of future plans ?

Sir P. Sassoon : I am obliged to my hon. Friend for raising this question. As I stated when introducing the Air Estimates, I am most anxious to further by all possible means the development of Empire air communications. Something has already been done in this direction in Africa. Proposals are under consideration for the establishment of an air service from Khartum to Kisumu and I understand that a recent conference of Colonial Governors at Nairobi approved in principle the granting of financial assistance for an experimental service on this route. The question of the establishment of a regular service, with an extension in due course to Cairo, will depend upon the result of the experiment and the prospects of adequate financial support. The development of aviation in the Union of South Africa and Southern Rhodesia is, of course, primarily a matter for the Governments concerned, but I propose to take the opportunity afforded by the Imperial Conference next October to discuss with the Dominion representatives the question of Imperial air routes and their future development.

SOCIETY OF MODEL AERONAUTICAL ENGINEERS

A meeting of the Society took place at Headquarters on Wednesday, March 17. It proved to be a distintly interesting one, both on account of the paper read and of the exhibits shown. The paper on "Rubber Motors" read by Mr. R. Langley gave an account of a considerable amount of experimental work carried out in this connection and was much appreciated. The results obtained, chiefly shown graphically, should prove of high value in future. A full account of this will be given in due course in the S.M.A.E. Journal.

Among the numerous examples of recent model work exhibited during the evening, the following are very worthy of note :—

(1) Mr. R. N. Bullock's new speed model (fuselage type).
(2) A fuselage speed model by Mr. J. O. Mortlock. Both of these models were of exceptionally good design and workmanship.
(3) Two sets of gears for rubber motors by Mr. H. T. Jackson.
(4) An ingenious new form of twin-winder with counting attachment by Mr. C. A. Rippon.

The following are the rules for the 1926 speed competition :

Speed Competition—1926.

(*To be held on Saturday, June* 19. *Ground to be decided later.*)

(1) Models for this competition must be fuselage models with a lifting surface not exceeding one square foot in area.
(N.B.—The fuselage must comply with the S.M.A.E. rule governing same.)
(2) The models will be required to fly over a "timed course," the timing to be done by a method approved by the Council.
(3) The length of the course shall be 150 ft. ; the starting and finishing lines each to be located by two posts, whose separation at right angles to the course is 100 ft. A tape will be stretched across the starting line at a few inches from the ground in order to ensure the model passing this line in flight.
(4) Models shall be started "rising off ground."
(5) In the event of two or more competitor's times being within ⅖ seconds of each other, a further trial shall be run to finally decide their times.
(6) The competition is open to non-members on payment of a fee of 2*s.* 6*d.*

1st prize.—The S.M.A.E. Cup and £1 1*s.* cash.

The rules for the other new competition, namely for Autogiro models, will appear at a later date.

Final arrangements were made (at the meeting) for the visit to Halton Aerodrome, where a model flying display is to be given by the Society on Saturday, March 27.

B. K. Johnson, *Secretary S.M.A.E*

⁂

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The directors, in issuing the balance sheet of the company as at September 30, 1925, report a profit on the year's trading, including interest on investments (after providing for depreciation, interest, taxation, directors' and trustees' fees, managers' commissions and contingencies) amounting to £237,542 8*s.* 10*d.* Add balance brought forward, £39,729 7*s.* 10*d*, making £277,271 16*s.* 8*d.* Deduct dividend paid on preference shares at 7½ per cent. per annum (less income tax) for the 12 months ended June 30, 1925, £22,500 ; interim dividend of 5 per cent. (less income tax) paid on ordinary shares on September 18, 1925, £27,300 ; amount transferred to general reserve, £100,000, leaving £127,471 16*s.* 8*d.* The directors recommend a final dividend of 10 per cent. on the ordinary shares, making in all 15 per cent. for the year, leaving a balance to carry forward of £72,871 16*s.* 8*d.* The directors add that the further improved results testify to the fact that the outstanding merits of Napier aero engines have been fully appreciated both at home and abroad.

A 16-ft. Metal Airscrew

What is claimed to be the largest metal air-screw yet constructed, a two-bladed propeller of stainless steel, has just been completed for the Air Ministry by Metal Propellers, Ltd., of Purley-way, Croydon. It is over 16 ft. in diameter, and is the first of a batch to be employed for the new Government rigid airship R.101. It is of the reversible type, a mechanism being provided in the hub whereby the angle of the blades may be varied.

SIDE WIND

Officers of the Royal Air Force will be interested to know that they are being very thoroughly catered for by the famous firm of Burch's in the Strand. We have this week received one of their New Price Lists and we note that they are still making a profound study of officers' R.A.F. Outfits by supplying the whole issue, not only Service Dress, but Boots and Hosiery and other equipment needed for an officer, and furthermore they are supplying New Commissioned Officers with their whole Outfit pending their Grant. We think this is indeed an exceptional offer and a boon to all those taking up the R.A.F. as a career. It is obvious that the reputation of this House is the result of thought, care and hard work—these three are embodied in every R.A.F. garment which is produced and sent out by them. That this service is appreciated to its fullest extent is evidenced by the wide circle of officers who are patronising them from almost every aerodrome both at home and abroad.

⁂

PUBLICATIONS RECEIVED

Canadian Patent Office Record. February 23 *and March* 2, 1926. *Vol. LIV, Nos.* 8 *and* 9. The Canadian Patent Office, Ottawa, Canada.

The Gloster. March-April, 1926. *No.* 6. The Gloucestershire Aircraft Co., Ltd., Sunningend Works, Cheltenham, Glos.

The Meteorological Observer's Handbook. 1926 *Edition.* The Meteorological Office, Air Ministry. H.M. Stationery Office, Kingsway, London, W.C. 2. Price 5*s.* net.

The Official Gazette of the United States Patent Office. March 2, 1926. *Vol.* 344, *No.* 1. United States Patent Office, Washington, D.C., U.S.A.

Notiziario Tecnico. No. 1. *January*, 1926. Direzione della Rivista Aeronautica, Via Torino, 39, Rome.

Il Volo Transpolare. By Col. Ing. Umberto Nobile. Stabilimento di Costruzioni Aeronautiche, Rome.

Civil Aviation : A Report by the Joint Committee on Civil Aviation of the U.S. Department of Commerce and the American Engineering Council. McGraw-Hill Publishing Co., Ltd., 6–8, Bouverie Street, London, E.C. 4. Price 12*s.* 6*d.* net.

Cambridge University Engineering and Aeronautical Societies' Journal. Vol. I, No. 1. W. Heffer and Sons, Cambridge.

⁂

AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations : Cyl. = cylinder ; i.c. = internal combustion : m. = motor.
The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

APPLIED FOR IN 1924

Published March 25, 1926.

27,910. J. H. Larrard. Aircraft framework. (248,051.)
28,330. R. S. Cheesman. Dirigible flying-machine of helicopter type. (248,065.)
28,600. F. L. Rapson. Tyres, wheels, etc., for use on aeroplanes. (248,086.)
28,665. Supermarine Aviation Works, Ltd., and R. J. Mitchell. Flying boats, etc. (248,088.)
28.697. G. H. Dowty and Gloucestershire Aircraft Co., Ltd. Landing-devices for aircraft. (248,090.)
29,197. Armstrong Siddeley Motors, Ltd., and F. R. Smith. Internal expanding brakes and clutches. (248,106.)

APPLIED FOR IN 1925

Published March 25, 1926.

1,631. G. Rietti. Flying-machines. (227,866.)
4,296. Bayerische Motoren Werke Akt.-Ges. Carburettor for aircraft engines. (230,043.)

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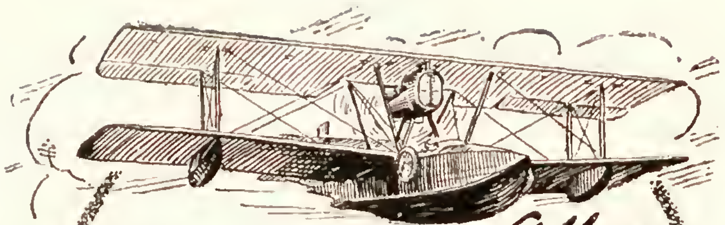

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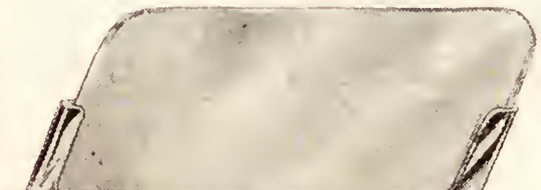

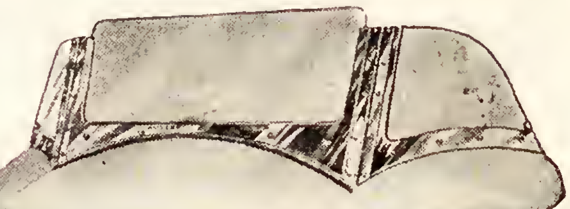

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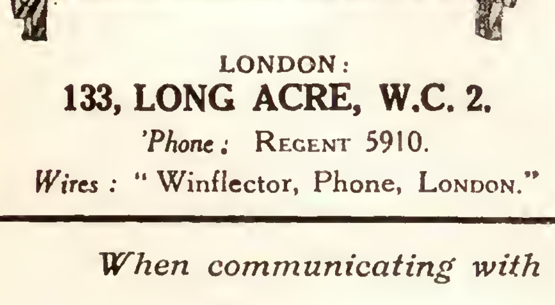

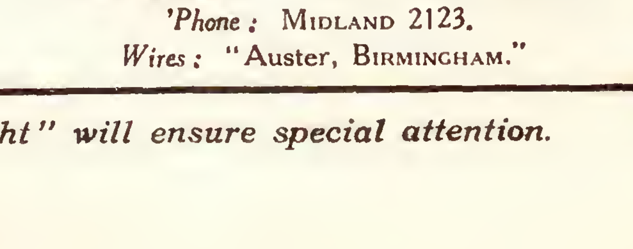

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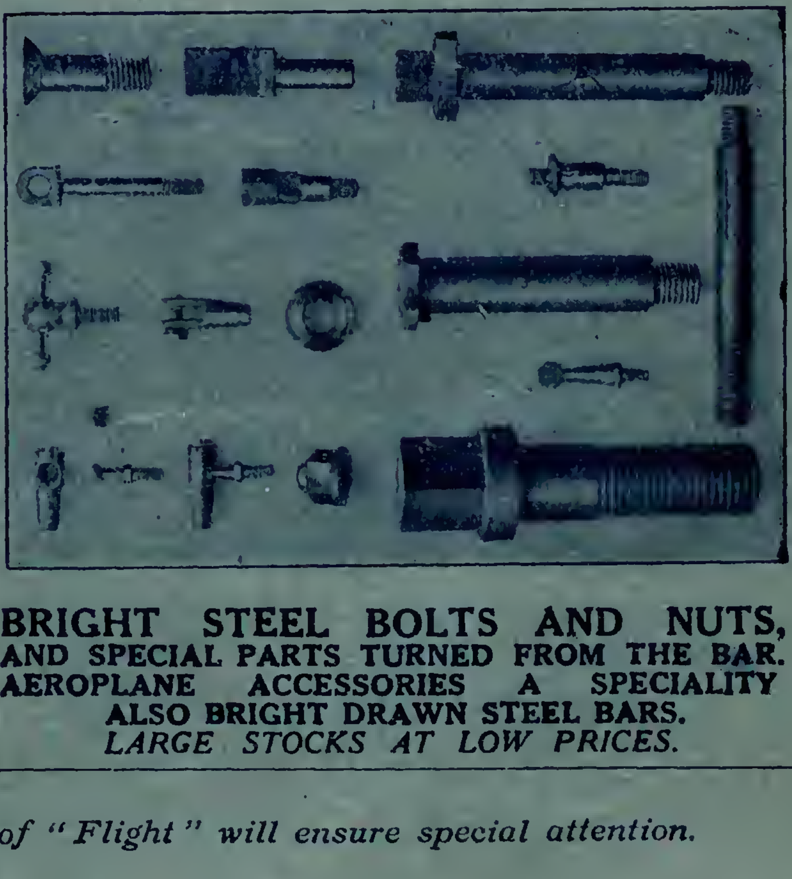

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4th January—8th March, 1926.

A standard Jupiter engine, No. 6067, in "Bristol" Bloodhound machine G-EBGG. completed observed flight trials of 225 hours total endurance with the A.I.D. seals unbroken, and with no replacements.

Average fuel consumption, 21.9 gallons per hour.

Average oil consumption, 3.95 pints per hour.

On removal from the aircraft, the engine was transferred without adjustment to the Heenan and Froude Brake and run for five minutes at full throttle and normal R.P.M., developing 440 B.H.P. Power, when similarly tested prior to the flight trials, was 452 B.H.P.

On dismantlement, the following parts are found to require replacement to render the engine again completely serviceable:—

One exhaust valve (stretched),
One inner valve spring (broken in first coil).

The condition of the engine on strip examination is excellent.

12-3-26.

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The following is the A.I.D. Report as to the condition of the major components after test:—

Component.	Average Wear during Test.
Cylinder Bore	Nil.
Piston	.0006
Gudgeon Pin Dia.	.0008
Small End Bush Bore	Nil.
Wrist Pin Dia.	.0003
Wrist Pin Bush Bore	Nil.
Crankpin Dia.	.0002
Big End Bush Bore	.001
Big End Bush Dia.	.0007
Master Rod Liner Bore ...	Nil.
Cam Sleeve Bush Bore ...	.0005
Crankshaft Sleeve	Nil.
Eccentric Gear Bore	Nil.
Eccentric Floating Bush O/Dia.	.0005
Eccentric Floating Bush Bore	Nil.
Eccentric Outside Dia. ...	Nil.
Crankshaft Tail Bearing ...	.0008

The general condition of the engine was excellent. As shown in the above table, the amount of wear was in no case sufficient to require replacement.

THE BRISTOL AEROPLANE CO., LTD. *Telephone—3906 Bristol.* *Telegrams—"Aviation, Bristol."*

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